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ORIGINAL COMMUNICATIONS.

On the Selection of Seeds. By Rev. H. COLMAN. [For the New-York Farmer, and American Gardener's Magazine.]

One of the most important points connected with cultivation is that of the selection of seeds, and to this matter it is believed by no means sufficient attention is paid. The farmer would be justly condemned for neglect and folly, who would attempt to propagate from unhealthy, deformed, or ill-shapen, animals. Indeed, every intelligent farmer is extremely, but cannot be unduly, solicitous in the rearing of live stock, horses, neat cattle, or sheep, to obtain the very best breeds, and the very best individuals of the breed from which he means to rear a stock, perfectly aware of the physical laws which govern all these operations of nature; knowing that like tends to produce like; that the qualities of the sire descend to the offspring; and if, by a judicious selection, any race of animals may be improved to a surprising and indefinite degree, so diseases, deformities, defects and bad qualities, are communicated with equal certainty; and, unless pains be taken to extinguish or abate them, they will be propagated in an aggravated degree. There is no reason why he should not use equal pains in the selection and preparation of his seeds, since the principles of improvement and deterioration, which apply to the animal, are found to operate with equal force in the vegetable creation.

Complaint is often made that seeds do not vegetate. Some plants are found to come to maturity earlier, and some later, year by year. The produce of some plants is found to increase, and of others to diminish, year by year. Changes of seed are found to conduce to productiveness, and are anxiously sought after by farmers. These are all familiar facts, deserving of consideration, and bear materially upon the subject before us. There are some extraordinary cases, in which, through a very false economy, the poorest seeds are selected. Thus, as diseased or shrivelled wheat will vegetate, many farmers in some parts of the country are in the habit of exchanging their sound wheat for poor and shrivelled grain, which is obtained at a cheaper rate, and which, as more grains in number are contained in the same measure than of plump sound grain, it is supposed it will cover more ground and furnish a larger number of plants. On this subject a most valuable remark is made by Sir John Sinclair:—"That light, defective, or diseased wheat will vegetate, there is no disputing; yet it is much to be feared, that the defects of the seed may be communicated to the produce; and these may even, as in some hereditary diseases of man and animals, pass over one generation and break out with virulence on that which succeeds." Some seeds, after a certain period, lose entirely the power of vegetation; and the town of Barnstable, where vast quantities of onions were at one time cultivated, and upon the success of which cultivation many persons greatly depended, some years since suffered severely by having obtained old seed. The responsibility in this matter, which rests upon the seed-raisers and the seed-sellers, is very great. They are under such strong temptations to sell old seed rather than throw it away, or, to save their consciences, by mixing it with new, that they should be men of the strictest honor and integrity; so likewise the raisers of seed, by taking that which is imperfectly cured, or that which is injured by its intermixture with other, or that which is gathered from parts of the plant, which ought not to be saved, or by neglecting to cure it properly, or to place it where it may be preserved from injury by heat or moisture, may practise such serious frauds, and with scarcely the possibility of detection, that they should be men upon whose scrupulous fidelity perfect reliance can be placed. Under these circumstances, and especially as from the quantities in large establishments necessarily kept on hand, their losses must every year be great, seedsmen should be encouraged in their integrity by a very liberal price, where you can rely with certainty upon the purity and soundness of the article. The difference of price between good seed and poor seed is a very small affair compared with the loss of a crop; and for a seedsman to tell you after your disappointment, unless he previously admonished you the character of the seed was doubtful, that he is willing to return you the price of the seed, as I have sometimes known done, is only adding insult to injury.

I have myself, in one case particularly, suffered severely by obtaining a corrupted seed of the ruta baga, many of the plants proving only a miserable, scraggy, white French turnip, as it is called, instead of the fine large orange colored Swede; and Brown, of Markle, says, in his "Treatise on Rural Affairs," that "a few years ago, this excellent root, (ruta baga,) was nearly given up by many farmers, because a spurious seed was furnished by the shops. However, by the attention of some respectable agriculturists, seed of a better kind has again been obtained, which may restore the credit of this valuable root. This credit, however, is only to be preserved by a continuance of the sedulity which caused its renovation; or, in other words, by keeping ruta baga at a distance from every other variety of the turnip and cabbage tribes, when forming its flowers, and procreating its successors."

If I do not mistake, Sir Joseph Banks recommended, as matter of great saving to the kingdom, the use of shrivelled or blighted wheat for seed, in preference to the full and sound, and as equally certain to vegetate. This, or other circumstances, led to some pretty full and exact experiments, which served to correct the error of this distinguished philosopher, an error pregnant with evil both to the agricultural interest and the public welfare. This experiment is fully stated by Brown and by Sinclair; and although it has been presented to the public on some former occasion, it deserves to be repeated, from its general aspect and bearings; and since the error, which it effectually disproves, is by no means extinct in several parts of our country.

"The late Benjamin Bell, Esq., in October, 1783, sowed a field of 12 acres at Hunthill, in Roxburghshire, with 54 bushels of wheat, of which 12 bushels were the best that could be procured in the London market of crop 1783; 30 bushels were from East Lothian of crop 1783; 6 bushels the best wheat in the London market of crop 1782; and 6 bushels produced near Edinburgh in that year, 1782. It must be remarked, that 1782 was a season generally unfavorable to raising wheat in perfection, but that in 1783 the grain was sound and of a good quality. The field on which these parcels of wheat were sown had been well fallowed, was equally manured with dung, and the whole of these seeds were sown in the beginning of October, all of them having been washed in strong brine, and afterwards dried with powdered quicklime. The English seed of crop 1783 was sown on one side of the field; 3 bushels of the Mid Lothian seed of crop 1782 were sown on the next three ridges; to this succeeded the English seed of crop 1782; then the East Lothian wheat of crop 1783; and lastly, the remaining 3 bushels of Mid Lothian seed crop of 1782."

"The field being all in good condition, the wheat appeared early above ground, and the shoots were every where strong, except on those ridges which were sown with the Mid Lothian seed of crop 1782, on which the plants were weak and not very numerous, neither did these spread or *tiller* like the others; so that during the winter and spring months, the wheat

on these ridges had a weak appearance, in harvest the straw was thin and short, and the ears were short and small, the grain likewise not being so large and heavy as on other parts of the field. On being threshed and measured, the produce of the 12 bushels of seed, crop 1782, both the London and Mid Lothian taken together, was only 66 bushels, or 5½ after one. The produce of the rest of the field was fully 15 bushels for every bushel of seed. The difference in value was also considerable, as the produce of the seed from crop of 1782 sold almost a shilling the bushel lower than the other." This experiment is certainly of the highest value, and shows the great importance of attending to the quality of the seed.

The authority of Joseph Cooper, of New-Jersey, is often quoted to show the great importance of attending particularly to the quality and character of the seed employed; the improvements which may be effected by this attention; and whether any advantages may be effected by a change of seed from one place to another. He has proved himself one of the best and most successful farmers in the country; and, as his practice may not be known to all your readers, I beg leave particularly to refer to it.

"Mr. Cooper, disregarding the ancient prejudice of a necessity for the change of seeds and roots, and the procurement of them from distant and different soils, on the contrary, has for many years been in the habit of selecting the best seeds and roots of his own; and although he has continually sown and planted them on the same soil, every article of his produce is greatly superior to those of any other person who supplies the market; and they seem to be still in a state of improvement. This, without his knowing it, is the very same plan that was adopted by Mr. Bakewell in England, with respect to animals.

"Mr. Cooper was led to his present practice, which he began more than forty years ago, by observing that vegetables of all kinds were very subject to change, with respect to their time of coming to maturity, and other properties; but that the best seeds never failed to produce the best plants. Among a great number of experiments, he particularly mentioned the following: About the year 1746, his father procured seeds of the long watery squash; and though they have been used in the farm ever since that time, without any change, they are at this time better than they were at first. His early peas were procured from London in 1756; and though they have been planted in the same place every season, they have been so far from degenerating, that they are preferable to what they were then. The seeds of his asparagus he had from New-York in 1752; and though they have been treated in the same manner, the plants have been greatly improved. Mr. Cooper has experienced precisely the same results with potatoes; and attributes the failure of other people to their planting the refuse instead of the largest and best shaped. Mr. Cooper is also careful to sow the plants, from which he raises his seed, at a considerable distance from any others. Thus, when his radishes are fit for use, he takes ten or twelve which he most approves, and plants them at least one hundred yards from others that blossom at the same time. In the same manner he treats all other plants, varying circumstances according to their nature."

"In 1772 a friend sent him a few grains of a small kind of Indian corn, not larger than a goose-shot, which produced from eight to ten ears on a stock. They were also small, and he found that few of them ripened before the frost. Some of the largest and earliest of these he saved, and planting them between rows of a larger and earlier kind, the produce of them was much improved. He then planted from those that had produced the greatest number of the largest ears, and that were the first ripe; and the next season, that produce, with respect to quality and quantity, was preferable to any that he had ever planted before. From this corn he has continued to plant ever since, selecting his seed in the following manner: When the first ears are ripe enough for seed, he gathers a sufficient quantity for early corn, or for replanting; and at the same time that he wishes his corn to be generally ripe, he gathers a sufficient quantity for the next year's planting, having particular care to take it from *stalks that are large at the bottom, of a regular taper, not very tall, of good sizeable ears, and of the best quality*; these he dries quickly, and from thence he plants his main crop; and if any hills be missing, he replants from the seeds that were first gathered, which he says will cause the crops to ripen more regularly than they commonly do, and which is of great advantage. The common method of saving seed corn, by taking the ears from the heap, is attended, he says, with two disadvantages: one is the taking the largest ears, of which, in general, only one grows on a stalk, which lessens the produce, and the other is taking ears that ripen at different times."

"For many years, he renewed all the seed of his winter grain from a single plant, which he had observed to be more productive, and of better quality than the rest, which he is satisfied has been of great use. He takes particular care that different kinds of the same vegetable do not bloom at the same time near together, by which they injure each other. Mr. Cooper has the following instance of the naturalization of a plant in a different climate. He had some watermelon seed sent him from Georgia, which, he was informed, was of a peculiarly good quality; knowing that seeds from vegetables that grow in a hot climate, require a longer summer than those in Pennsylvania, he gave them the most favorable situation he had, and used glasses to forward their growth; and yet few of them ripened well; but saving the seeds of those that ripened first, and continuing the practice five or six years, they came to ripen as early as any he ever had."

Such was the practice, and such is the authority of this eminent cultivator. The subject is of great importance; the influence of his example has been very great already, and ought to be extended; and it presents a beautiful proof of how much good may be effected by the most humble experiments, when conducted with intelligence, exactness, and fidelity.

Another example is given on the authority of Mr. Cooper himself, strongly illustrative of the importance of this subject. "A very considerable and curious farmer, in the back part of Virginia, being desirous of procuring a better kind of wheat than was to be had in the neighborhood, went to Baltimore, and examined the wheat in every store in the place; took some home of the kind which pleased him best; gave it the best cultivation, and being very attentive to its growth and appearance, happened to observe one stool or plant so much earlier than the rest, that it became perfectly ripe when the grain of the other was only getting into the milky state. The grain from this plant he saved, and so carefully and successfully cultivated, that in a very short time he sold 1500 bushels for seed." This is a very remarkable instance of good judgment and perseverance in pursuit of a useful object, and of the ample reward which always, in a greater or less measure, follows such efforts.

I have another case of success in forwarding the ripening of a plant, by selections of the earliest ripe seeds for a succession of years, managed with that skill, intelligence, and care which, mark a great mind, even in the humblest affairs.

My highly respected friend, the Rev. Dr. Freeman, of Boston, then occupying a small farm in the vicinity, gives the following account of an experiment made by himself, showing the importance of selecting the first ripe seeds, and communicated it to the trustees of the Massachusetts Agricultural Society, Sept. 1, 1805:

"To ascertain whether the ripening of seeds can be forwarded by sowing those which are earliest ripe, I have made experiments, all of which have been successful, on several different sorts. It will be sufficient to mention one only.

"In the year 1801 I planted the case-knife bean. The pods first formed, which are commonly those nearest the root, were reserved; and when about the quantity of a peck was fully ripe, they were gathered on the same day. The largest and fairest of the seeds were planted the next year, and the first formed pods reserved as before. The same method has been pursued without any variation till the present year, by means of which, whilst the bean has not degenerated in its quality, the ripening of the seeds has been forwarded twenty-six days, as will appear from the following table:

Planted.	Gathered.	No. of Days.
1801, May 20	Sept. 9	112
1802, May 11	Aug. 21	102
1803, May 10	Aug. 8	90
1804, May 8	Aug. 4	88
1805, May 6	July 31	86

"The first column denotes the time of planting the seeds; the second, that of gathering the seeds which were first ripe; and the third, the number of days which

elapsed between the time of planting and the time of gathering.

"As in the second and following years I anticipated the time of planting the seeds, (by which means fourteen days have been gained, in addition to the twenty-six noted above,) to determine what effect late planting would produce, by giving the seeds more advantage from the heat of summer, in the years 1804 and 1805, I put into the ground a quantity of seed, about a week later than that which was first planted. The event which took place is exhibited in the following table:

Planted.	Gathered.	No of days.
1804, May 14	Aug. 3	86
1805, May 13	Aug. 6	85

"As very little time has been gained in the present and in the preceding year, I suppose I have now reached, or nearly reached, the *ne plus ultra*. I delay not, therefore, to communicate to the trustees of the Agricultural Society, the result of an experiment, which confirms the important truth taught in various parts of their useful publications, *That to ensure an early and good crop, the seeds reserved for future sowing should be those which are the first ripe, and which are in other respects the most perfect.*"

Not a word need be added to an experiment so exact and decisive as the above; and without further comment I submit the subject to the intelligent and enterprising cultivator. H. C.

Meadowbanks, June, 1835.

Saxony Sheep—in reply to R. By H. D. Grove. [For the New-York Farmer, and American Gardener's Magazine.]

Mr. S. Blydenburgh: Sir,—I wish to present, through you, to the New-York Farmer, and through it to the public, a few remarks in reply to a communication in the last May number of the Cultivator, with the signature R., against which, as I consider it calculated to do me serious injury, I hope you will not deny me the privilege to appear and defend myself.

It is certainly laudable in any person to wish to acquire a good reputation; but it is not laudable when that wish is so strong as to cause him to use unfair means to obtain it. There is room enough in the world for every honest man's reputation, without pulling down that of others to build his upon the ruins.

That Mr. R. is a respectable sheep breeder, and is entitled to the full credit of having introduced into the country a valuable breed of sheep, I have no disposition to dispute; I should rejoice in his success, and would not withhold from the public any part of the little share which I can give of the praise which is his due. But I should think Mr. R. ought to have reflected that other people may value their reputation as highly as he does his.

To a man who has adopted the business of sheep breeding as his main concern in life, and has had the ambition and the enterprise to procure a choice breed from a foreign country at great expense, the reputation of the breed so introduced becomes in a measure amalgamated and inseparably connected with his own. If it possesses the supposed merits, to traduce its character in the public estimation is not only to deprive the public of its benefits, but to circumvent the introducer, and mollify his honest hopes of the remuneration to which he is entitled.

There are several distinct points of excellence in which the value of sheep consists, each of which is of high consideration. No one breed of sheep possess them all, but thousands of flocks are destitute of any of them. The most important qualification to the manufacturer is to produce the finest wool, as that quality affords him the greatest profit, and gives him the highest reputation. A qualification of equal value to the ordinary farmer, and perhaps to the mass of mankind, is to shear a great fleece, though of middling quality. A third point, which is of the highest importance to the butcher and the epicure, and not unimportant to the farmer, is the quantity and quality of the carcase. A fourth point, which is of general importance to all, is hardiness of constitution. Now, since no one sheep ever possessed in any thing like the highest degree all these important points, it is very natural for one man to attach the greatest importance to one point, and another to another point. The man who feels a pride in wearing the very finest cloth, and who has the wealth to gratify it, will probably feel a corresponding gratification in owning the sheep which produces the wool to make such cloth, especially if it affords him a profit equal to, or greater than, that from other breeds. Another man's pride will be enlisted altogether in favor of a sheep of enormous size, especially if it shears a fleece in proportion. No matter if it is coarse; there are more people, he will say, to wear coarse cloth than fine. In the mean time, the man who measures his enjoyments in life by the quantity of good eating, says, give me the sheep that yields the meat, and you may take the wool, fine or coarse. But the man who is rather sparing of his labor, and wishes to feed a great flock with as little trouble and expense as possible, who would like to insure a flock to live like the Irishman's horse, without eating, and to scorn a shelter in the severest snow storms, such a man would seek a breed, if he could find it, which would thrive and improve under such treatment. I am perfectly willing that each of these men should enjoy the benefit of his choice of these breeds of sheep, or even of all of them, and I only ask in return to enjoy the same privilege.

I am perfectly willing to concede to Mr. R. all the absolute properties that he claims respecting his South Down sheep, or any other sheep he may possess. If they are capable of sustaining the cold of the polar regions, or the heat of the torrid zone, or can live on air, like the camelion, I should certainly feel rejoiced in his good fortune. I have no desire to enhance the character of my sheep by depreciating that of his.

Mr. R. begins his remarks, after answering the five queries, which, by the by, he answers very much to suit his own purpose, by generously conceding a point, which I think he dare not deny, that the "Saxon sheep undoubtedly produce the finest wool." For that concession I thank him. "But," he continues, "their fleece is light, seldom exceeding in weight 2½ lbs., and is too open to resist our storms." They are feeble in constitution, require great care, are poor nurses, and their lambs are raised with difficulty. The mutton from such sheep must necessarily be of a miserable description!" He further states, "that he believes in Connecticut even the pure Saxony sheep may now be purchased at a comparatively low price, say from six dollars to four dollars a head, and perhaps lower still," and he remarks in another place, "I desire to be understood as speaking of all the pure breeds, and not of grade sheep." Again he says, that "the farmers are now aware of their error in using the Saxon cross, which has ruined the constitution of their flocks, and decreased their clip of wool nearly one half, and reduced their produce until, with ordinary management, more than twenty-five lambs are seldom raised from a hundred ewes."

In answer to all this I would in the first place remark, that there are nearly all sorts of sheep in Germany, and even in Saxony, very poor, as well as perhaps the best in the world. Sheep have been imported from there for speculation, by persons who neither knew nor cared about their qualifications. It was enough that they were Saxon sheep; and probably sheep have been sold as such which never saw Saxony. In the first place, I think Mr. R. must have received wrong information about the twenty-five lambs to a hundred ewes, and the other dreadful sheep-killing stories he tells against the *pure breed* of Saxony sheep, for I have been much among sheep breeders in this country, and I never heard of any such case before. In the next place, I am confident Mr. R. must have been deceived as to the identity of the *pure* Saxon breed, or, at least, we differ in opinion respecting that breed. That he may have been misinformed or deceived in both these cases, I think is evident, from the fact of his having gone so headlong as materially to injure a flock of nearly 2000 grade merinos by "one single cross of Saxony." A cautious man would not have experimented upon a scale so unnecessarily large. If he means some speculative breed of Saxon sheep, he ought, I think, to have said so, and not by his statements injure the reputation of my breed, which I think I shall show he knows nothing about.

But as I wish to put the most charitable construction upon every man's conduct, and to be on friendly terms with every one, especially a brother wool-grower, and as he, brother R., has been so kind as to concede to the Saxon sheep (though perhaps he did not my sheep) the only point of absolute superiority I ask for them, I will concede to him, if he wishes, that the South Downs, that is, Mr. R.'s

improved pure breed of South Downs, excel all other breeds of sheep in every good qualification, except the one he has had the goodness to relinquish to the poor Saxons—that they are perfectly capable of enduring all weathers from the equator to the poles; that they will eat and thrive on any thing vegetable, fossil, or mineral, or go without eating. I will also, for the sake of a good understanding with Mr. (I mean brother) R., not only admit that he did not mean to do me any injury, but I will prove that he had no allusion to my flock, and was altogether unacquainted with it, both which will evidently appear from the following substantial *facts*.

There is in Saxony a breed of sheep which were introduced and reared with great care by Augustus, Elector of Saxony and King of Poland, which, in commemoration of the introducer, have been called the Electoral breed. I was brought up in that country to rural husbandry, particularly to the care and management of sheep, and was perfectly acquainted with the purest and most celebrated flocks. From these I selected my sheep, and brought them to this country. They bore the fatigues of the voyage remarkably well, and arrived in safety. I sustained some little losses at first, from being a stranger to the peculiarities of the country, from having to hire my sheep kept, for want of suitable accommodations, and of such fodder as I wished. During the last eight years, and since I had a farm of my own, I have not lost over 1½ per cent.: for the last year not more than 1 per cent. The last two winters I had no loss, and the last year I raised 101 lambs, from 100 ewes, one only of my ewes having twins. The sheep which R. speaks of do not shear more than 2¾ lbs. My flock, last year, of 200 ewes and lambs averaged 2 lbs. 6½ ozs. If I had had a proportion of wethers, they would probably have averaged 3 lbs. My grown bucks sheared 4½ lbs. He says they (that is, the sheep he speaks of,) are poor nurses; my ewes are uncommonly good. All these facts can be abundantly proved from my sheep records, in which births and deaths, and every thing of importance, is recorded, and from credible witnesses. All these facts, in which there is no guessing, show conclusively that R.'s statements about the *pure breeds* of Saxon sheep did not allude to my sheep at all; and therefore I hope there will be no unkind feelings between us.

Respecting the "*miserable*" quality of the meat, if R. will procure the best sample of South Down mutton he can find, I will meet him at any place he shall name with a sample from my Saxons; both shall be cooked in the same manner; he shall select one or more of the most accomplished connoisseurs in good eating, and I will rest that point on their decision.

I have but one little statement more to add, and I will then leave the subject to the public. The prices current of wool in New-York, given in the Cultivator for the last month (May), are for Saxony, 80 cents; for half-blood 53 cents, and for native, 33 cents. Now, allow my ewes to produce 2¾ lbs., (and they will rather overgo than fall short of it,) then at 80 cents the fleece will bring $2.40. Allow the South Down ewes to shear 4 lbs. and allow it to be equal to the half blood merino, and the amount will be $2.12. Allow the Bakewell breed to produce 7 lbs., which is 1 lb. more than R. rates them; this at 33 cents will be $2.31. The three fleeces will stand thus:

Saxon, - - -	2.40
South Downs, -	2.12
Bakewell, - -	2.31

With these remarks, I submit the subject. HENRY D. GROVE.

Buskirk's Bridge, June 2, 1835.

Notices of the Season. By H. C. [For the New-York Farmer.]

The season now (12th of June) is auspicious to the farmer's hopes; and though vegetation has been unusually retarded, yet it promises, by its rapidity, to make up in a measure for the time which has been lost. In this part of the country, the grain crops, especially the wheat, have suffered much from the severity of the winter, or rather, I may say, of the spring; for many acres of late sown wheat which had come up, and appeared likely to do well when the snow went off, was almost entirely killed by the severe cold of the 7th of April. Earlier sown wheat looks better, and on good land is strong and thrifty. Rye in general, in this vicinity, appears well. Corn, though small, has a remarkably healthy appearance, and is making rapid advances. The earlier planted did not come up so well as that which was later planted. Many persons have doubted the expediency of tarring the seed corn, as has been much practised of late for a security against the depredations of birds. It is generally admitted to be a perfect protection against crows; it is not so, however, against squirrels. If the seed is soaked and swollen before tarring, the tar does not prevent its germination; but if the seed is dry when it is tarred, and a drought follows the planting, the coating becomes hard, and it is believed that much of the seed fails to germinate. It is a miserable economy to be sparing of seed. Many persons are in the habit of planting not more than five, and frequently not more than four kernels in a hill, when they design that four shall stand. Should any of the seeds through any circumstance fail, and from various circumstances it may fail, there is consequently a serious deficiency of plants, many hills producing only three, two, or one stalk, the consequences of which failure must be a great diminution of the crop from what might otherwise be expected; whereas, on the other hand, the liberal use of seed, even to eight and ten kernels in a hill, gives not only a better security for a well and amply stocked field, but also gives the farmer the opportunity of selecting among his plants the most healthy and vigorous to stand. This is obviously of much advantage, and the Messrs. Pratts attribute their extraordinary success in raising 175 bushels of corn to the acre in a considerable degree to this abundant use of seed, which gave them the most favorable chance of selection. The condition of the Indian corn always essentially affects the farmer's prospects in New-England. He looks to it for his pork, his beef, and much of the direct food of his family. To him it is of much more consequence than the wheat crop; and, regarded in all its various and valuable uses, as "meat, meadow, and manure," in its grain, in its abundant and nutricious fodder, and in its compensating returns to the manure heap, he cannot too highly estimate it. We may say with Arthur Young, that those countries in which this plant comes to perfection may consider themselves as signally blessed by a beneficent Providence.

The grass is in general backward and deficient. The pastures have been uncommonly late, and are yet far from having reached their usual luxuriance at this season, so that sheep and young stock, owing to the condition of the weather, and the state of the pastures, were kept of necessity very late at the barn; and the partially fatted cattle, customarily turned into the pastures early, that they may go to the markets as summer beef, it is thought will fall much short of their usual thrift and condition, at the common time of sending them.

Owing to the severity of the weather, the losses among the lambs have been, as far as we can get information, extraordinarily great, many farmers having lost as much as fifty per cent. of their lambs. Great numbers of old and declining sheep have died; and one farmer within our knowledge, in a hill town, where the cold is always severe, and the season backward, out of a flock of two hundred has lost, as he informed me, twenty sheep, and one hundred lambs. Though early lambs, if you could calculate with more confidence upon success, are to be preferred, on various accounts, to late lambs, yet, in our climate, it deserves consideration whether it is best ever to have them come until May, when the weather becomes mild, and there is generally a good bite of grass in the pastures. One of the most eminent shepherds in the country, whose flock exceeds a thousand, informed me that he had for some years practised upon this plan, and to this he thinks he mainly attributes his great success in raising lambs. The condition of his flocks, which I saw in May, and than which I have seen none superior, are satisfactory tests of the excellence of his management.

A great scarcity of fodder has prevailed in many parts of the country. In some places cattle have died of starvation, and much of the stock has gone to pasture in a lean condition. The prices of all agricultural produce have been, and continue to be, for a time of peace, unusually high. Hay has, in many places, brought double its usual price. Oats, instead of forty, have commanded 62½ cents per bushel. Wheat and flour have been at a great advance; and Indian corn, in most parts of

the country, readily commands a dollar. Butter, beef, and pork, have in all our markets brought high prices. There is, in truth, no scarcity of these articles, although there is no superabundance; something of these high prices is to be attributed (without doubt in respect to the sudden advance of wheat and flour) to mere speculation; but much probably to the depreciated value of money, owing to the perilous extension of the credit system, and the enormous emission of paper currency. To what extent this system may be farther pushed without extreme hazard, is hardly matter of conjecture. The resources of the country are immense, and absolutely indefinite; and this vast amount of artificial power, so long as its soundness r mains unshaken, by stimulating enterprise and industry to their highest pitch, vastly increases the riches and capital of the country; but a day of reckoning may come before the country has acquired vigor enough to endure this system of repletion. Violent excitements in all human affairs are pretty certain to be followed by a corresponding re-action. The fever of speculation is usually succeeded by a painful relapse. Much of the credit which prevails must rest upon an unsubstantial basis—or, rather, upon no basis at all; upon capital purely fictitious; or upon the mutual pledges of men, who have no property severally, and of course none conjointly, to redeem these pledges. We would not be prophets of evil, nor cast a single shade over the brilliant and unexampled prosperity which seems to swell in every stream, and to pervade every part of this growing empire; but the continually increasing extension of a paper currency is evidently a perilous experiment; and this banking system upon the high-pressure principle, beautifully as it now operates, and rapidly and gaily as it hurries us along, may lead at last to an explosion, the consequences of which no experience is wise enough, and no imagination bold enough, even to conjecture. H. C.

Meadowbanks, June, 1835.

Lunar Influence. By L. [For the New-York Farmer, and American Gardener's Magazine.]

Most of the astronomers, or those who calculate our almanacs, say that the moon has no influence on the weather, or that all predictions in regard to it are but mere guess work, and that they put it into their almanacs to gratify elderly women and children. In my childhood and youth some account was made of signs, particular days, &c., and I was taught to believe there was some truth in those things; but when I came to look a little into astronomy, I was led into the opinion of the almanac makers, that such predictions were altogether guess work, and there was not in those signs and particular days what was pretended; neither do I now wonder at the conclusion of these astronomers, as the mere knowledge of the course of the planets can give no clue to the effect their bearing and distance have upon one another, as their effects or influence can be learned only by personal observation and comparison.

Early in the course of my observations I was led to the conclusion, that there must be some cause for all the changes we have in the weather, and that if we could learn the knowledge of these causes, we might foretell what the weather would be in future time. I have, however, thought sometimes that it was a wise provision of Providence, and happy for man, that he can know no more of futurity than is necesssary. But so important it seems for the farmer and the sea-faring man to know what the weather will probably be at a future time, that it seems quite worth a little attention to endeavor to learn the causes of wet and dry, heat and cold, high winds, long storms or short ones, in time to come.

Thus, in the course of my observations, I could not but refer at times to the remark of the Indians, the ancient inhabitants of the country of my youth, of which there were then a number of them living, and that was, that after the change of the moon, if the corners pointed up in the form of a dish, it would be dry weather that moon, but if one down and the other up, it would be rainy or wet. Although astronomical knowledge taught me that this was without foundation, still, from repeated remarks, I was finally compelled to admit that there was some truth in the observation; and, in process of time, was led to form the following conclusion: that is, when the moon changes in high north latitude, it is generally cold and dry; but if in extreme south latitude, warm and wet, and apt to be stormy. It may be remarked, that when the moon changes in high north latitude, it makes the figure of the corners pointing up, and in extreme south the other figure, which verifies, in a measure, the truth of the old Indian's remark. Hence, although admitting that the sun and moon are the principal agents in governing the weather, there seem to be other causes which at times vary their influence, so that it is still an uncertainty; but I have very rarely known it to fail, that the moon, in extreme south latitude, denotes warm and stormy weather, and in high north latitude cold and dry; and if we have ever so great prospect of storms in the latter, they are apt to be of short duration. As my limits will not allow me to go further into detail, it may suffice to remark, that if our almanac makers would give us the latitude of the moon at the full, change, and quarters, with the course she is going, whether north or south, we might foretell the weather for ourselves, or they might give it by their own judgment from the moon's latitude in probability.

Every one may know that the northing and southing of the sun makes our seasons of summer and winter. So fully am I persuaded, of the moon's influence in varying these seasons, from observation and experience, that I have been led to believe that it extends even to our vegetation; so that I prefer planting and sowing after the full moon and before the change. But prejudice and imagination are next to reality, and those who are not satisfied with the observations of others, had better experience for themselves. L.

Grasses for Hay, Pasture, &c.—The White Daisy. By L. [For the New-York Farmer, and American Gardener's Magazine.]

Mr. Editor: I have noticed some remarks in your Magazine on the various kinds of grasses suitable for hay, pasture, &c., but I have not seen any mention about the white daisy, or what we generally call white-weed, which makes the fields of some farmers look, at a distance, white as a snow bank. The old fashioned people, or farmers, in former times were, and some yet continue to be, very prejudiced against this kind of grass; and I was taught in childhood to pull it up, and to endeavor to keep it out of our fields, as a very bad kind of grass. One of our nearest neighbors had some of his fields full of it, and his boys sometimes, to vex or irritate, would threaten to sow some of the seed in our fields, which we thought would do us great injury; but, as I grew older, I began to observe that this man's cattle and horses, with their white-weed hay, were always in good order, and that he had good fields of corn, good grain, &c. In process of time I hired a large farm, which was pretty well filled with this white-weed, on which I had a chance to learn whether it was a benefit or evil to farmers. It may be proper to observe, that when this white-weed gets into land it is apt to continue without sowing it, even after it has had a crop of corn and grain. Whenever it is laid down for grass, it will come again, so that whatever other kind of grass you are inclined to sow, you will have a part of this white-weed with it, except you sow clover or herds very thick and make the land very rich, which will keep it out. When I went upon this farm there was some meadow land seeded to grass the year before with herds grass seed, not so thick but that the white weed come with it, so that it was in appearance about half of one and half the other. I had good hay weather to make it, and I put it by for my oxen and team horses to do my spring's work, and in the conclusion I considered it the best hay that I had ever given to oxen or horses. To my oxen I gave, while I had that kind of hay, neither grain, turnips, nor potatoes, nothing but the hay, and to my horses but very little, and they were as well able to do a day's work at the end as the beginning. I have found it also good for cows and sheep; and besides this, it prepares the ground in good order to plough for corn. But it is not good for pasture, as cattle or horses will not eat it green, especially the heads; and that, I suppose, is the reason why so many are prejudiced against it. As it is not good for pasture, there must of course be some disadvantage in having it in land that is not profitable to plough; but it is not apt to grow much in land that is too wet to be ploughed; and if it gets into pastures, it can be mowed early, which will make good hay for sheep, and thus give the other grass a chance to grow, and, moreover, it will afford a crop of hay when the worms have eat every other grass up, and this, it seems, is another reason why many are yet prejudiced against it: as they say, if the worms will not eat it, surely it cannot be

good for cattle. But so fully am I satisfied with it as hay, that I have sown the seed, in order to get it into the land where I now live, as it was not in this country when I came here; but some of my neighbors still continue to be prejudiced against it, notwithstanding all I can say to them. L.

The Cold and the Caterpillars. By H. C.

[For the New-York Farmer.]

"It is an ill wind", says the proverb, "which blows nobody any good;" and how very few such ill winds there are. The two cold and backward springs, which have last followed each other, though deplored by many in their transit and exciting painful apprehensions, have not been without signal advantages. The spring of 1834 was marked by as great an amount of cold as that of the present year; but the opportunity was more favorable for the farmer's labor, and vegetation was not so backward. The cold weather in 1834 continued into June, but then there was a warm and open March. In this year our warm and open weather was in February; and the cold was scarcely intermitted through March, April, and to the 20th of May. In both cases we had a severe snow storm in this part of the country, (Mass.;) and extending far west and south, on the 14th or 15th of May. The effects of the cold weather in 1834 were to destroy nearly all the fruit. The effects of the extreme cold of the last winter has been to destroy many of the trees and vines; but as the blossoming was very late, upon those trees which survived the extremity of the cold, we believe there has never been a greater promise of fruit than at this moment.

The advantages of this cold weather to our orchards have been on the whole very great. In many parts of the country the canker worms were making dreadful havoc; devouring every green leaf, and presenting, wherever they prevailed, the appearance of a desolating and scorching fire. As far as we can learn, the cold weather or late frosts has effectually destroyed them. We hope, on this subject, we are not misinformed. In many places, too, the caterpillars were prevailing in great numbers; and had become an appalling and disheartening scourge. On the bleak hills, where vegetation is backward, they still remain; but in lower and more sheltered situations, where the temperature was at any time such as to bring them out, the late cold and frosts have nearly annihilated the whole race. Now, although we cannot, upon any principle of natural justice, deny that the canker worms and caterpillars have as fair a claim to the leaves as we have to the fruit, yet since this question is settled for us by a judgment to which there is no demurrer, and from which there is no appeal, we may at least congratulate ourselves that this decision is so entirely in our favor; and we may lay down our arms, since the enemy is no longer in the field. H. C.

June, 1835.

Value of Female Labor. By H. C. [For the New-York Farmer.]

One of the most remarkable features in the present condition of this country is the high value of female labor. In foreign countries this labor has been comparatively very poorly paid; and in some it has been, and continues to be, of a servile and degraded character. In England a great amount of agricultural labor of the lightest kind is performed by women, such as hay-making, reaping, weeding, picking hops, &c.; and to this there can be no reasonable objection: this work, in fact, not being harder, and in every respect much more healthy, than exclusively indoor and sedentary employments to which they are confined among us; and it is, without doubt, to these active and outdoor occupations, must be attributed that extraordinary ruddiness, vigor, and elasticity of movement, which distinguish many of the English above our own women; and particularly their freedom from those dreadful nervous complaints by which so many of our females are constantly oppressed, and bring upon themselves a premature and dismal old age. On many parts of the continent much of the severe portion of agricultural labor devolves upon them, even to the carrying out of liquid manure in buckets upon their heads, and ploughing the land, and gathering the heaviest crops. Against this, indeed, we should utterly protest, as not at all suited to their nature and strength. In our own country we have very few examples of female agricultural labor, excepting the Wethersfield girls in Connecticut, who, poor things! spend all the week in weeding their onion patches, with tears in their eyes; and, happy beings! by a sudden transition, are seen on Sunday with cheerful faces, and in their gayest attire, the fruit of their own honest and laudable earnings. But in other employments, our women bring their labor to a most successful market; and the demand for it is daily increasing. The wages of female agricultural labor are in every part of Europe not more than a third that of men; and if we can infer any thing from the extremely low price at which many articles of manufacture, the produce of female labor, are imported and sold in this country, their services receive an extremely moderate and inadequate compensation. In our cities, heretofore, women employed as seamstresses have been poorly paid, and have many times been so severely oppressed and abused by their extortionate employers, that they have been driven to desperation, and yielded to temptations which have ended in infamy and ruin. But women now, who are capable, and industrious, have their full share in the prosperity of the times.

In the country, in family service, where indeed a woman can be found willing to enter it, a capable, honest, and good domestic, may command almost any thing, she will demand from one to two dollars per week. In cotton and woolen factories those who are diligent and capable earn, besides their board, from three to four, and in some extraordinary cases even five, dollars a week. The braiding of palm leaf hats is now carried on most extensively in several parts of the country, and many young women, living under their parents' roof, find no difficulty in earning two and three dollars per week. Great numbers of young women are employed as seamstresses in our large clothing establishments; as binders in our hat and shoe manufactories; as makers of shoe pegs in those establishments; as folders in our book-binderies; as compositors in our printing offices; as attendants upon the press in those offices where the printing is carried on either by water or steam; as bottomers or weavers in our chair manufactories; in various operations in our comb-making establishments; in our twine factories, as spinners; in some of our steel factories, as grinders and polishers; in our segar establishments, as rollers of tobacco; and in such a variety of other manufactures that it is quite impossible to enumerate them. In all these cases their compensation is liberal and ample.

This is altogether a new spectacle in the condition of society; and one which the benevolent mind will contemplate with pleasure. It must be allowed that many of these occupations are pursued at the expense of that household education, which is indispensable to qualify them to preside with skill and propriety over our domestic establishments, as wives and mothers; and we are not without serious apprehensions, in respect to the moral results of congregating young persons of both sexes in great numbers in any situation, especially where they are withdrawn from the inspection of parental solicitude, and all the favorable influences of domestic life. But we will hope the best. In every human condition there is a mixture of advantages and evils. We will hope that the advancing education of the community will do all that we have reason to expect from it, in saving us from the bitter and degrading experience of older countries. We know that in many of our manufacturing establishments, under the direction of the intelligent and high minded men who have the charge of them, the most scrupulous and commendable attention is paid to the preservation of good morals, and the general improvement of the condition of society. May those who hold stations so responsible, and exert an influence so commanding and important, use it for good; and never lose sight of their high obligations. For ourselves, we believe that much of the intellectual and moral degradation, which has marked any portion of the female sex, in any part of the world, (and we would not be forgetful of the eminent and preponderating virtue, which has in such a majority of cases raised them above all the disadvantages of their condition,) is to be directly ascribed to the condition of extreme dependence in which they have been placed. Whatever increases the value of their labor raises them above this de-

pendence; begets a spirit of self-reliance and self-respect; inspires a sense of the value of character; and kindles a zeal for improvement. All this is favorable, both as the security and promoter of virtue; all this will essentially contribute to elevate the moral and intellectual character of women; they will cease to be regarded merely as the creatures of man's pleasures, and the slaves of his caprice; and assume the proper dignity of an equal partnership in all his concerns, trials, cares, and duties; and they will rise to that condition in which God designed and Christianity tends to place them, not at the feet, but at the side of man. H. C.

June, 1835.

Drinking Cold Water, also Ardent Spirits. By L. [For the New-York Farmer, and American Gardener's Magazine.]

In a savage state nature seems to be sufficient to dictate to man what he may eat, and what and how much he may drink; but in a civilized or barbarous state, or a state of arts and sciences, it requires an additional art to know how to use these arts with propriety or safety.

I was taught in early life to consider my fellow-man as a rational being, and, therefore, was led to believe that this rationality would of course teach him to use all the good things of this world with propriety and safety for his own proper benefit, &c. And so strong and deep was this impression that I was far advanced in years before I could relinquish a degree of this belief; but at length was compelled to believe that the rationality of the generality of mankind was not sufficient, however finely cultivated, to restrain them from ruinous excesses. I had, long before a temperance society was thought of, been fully and thoroughly convinced that the use of ardent spirits, for people in health and laboring men, was injurious to health and an obstruction in the progress of business men. Although custom was strong against me, I always endeavored to keep it out of my fields, and for the most part succeeded. I carried on the farming business in sight of my neighbors, who indulged freely in the custom. I says to my men: Beef and pork, bread and milk, butter and cheese, every thing that the farm produces, is at your disposal—go and eat when you please, if you will do so without rum or ardent spirits, and thus I generally carried my point. Although my neighbors' men were more noisy, and sometimes did a little more work in the fore part of the season, but in the fall, or end of the season, I had more work done, and the men in better health and much stronger. But the greatest difficulty I had was with carpenters: the custom with them to have their grog was almost universal. I could not prevail with them until I began to build my house, in which I now live, and then I prevailed with them in consideration of 6*d.* a day extra, and, at the close, found I had made a very good bargain. But notwithstanding all this, when temperance societies were first introduced, I did not readily fall in with the plan, the impression remained so strong, that man was rational, that I still thought that the evil might be cured by working on his rational faculties, and not fence against him as we do against the brute creation. But, finally, I have had to give it up, and admit that temperance societies are the only plan that will cure the evil of the excess of drinking ardent spirits, and that they have already operated as a great relief to those who are clear of the excess themselves, as well as the thousands who have been saved from ruin; and, though humiliating to the rational mind, has proved to be a case of necessity. The next thing is a few remarks on drinking cold water. It is well known that more or less have died almost every summer by drinking cold water, but not a thousandth part of the number that have died from the excessive use of ardent spirits. But small as the number is, I shall endeavor to show that there is no need of even that, and that it is alone the effect of ignorance.

Man, some like all the rest of the animal creation, requires a portion of water, or liquid, with his food, to sustain existence; and, some like a camel, he seems to have a cavity or vacancy in the stomach in which he can take a sufficient quantity to sustain him some length of time, depending on circumstances. When this store of liquid becomes diminished, or carried out into the system, nature dictates to replenish it by our being inclined to drink to fill it up, and mankind fill it up with such as they can get, but the intemperate are inclined to fill it with ardent spirits, which makes the case worse, for the more he drinks the more he wants, as it does not do what nature requires. But when this vacancy is filled in time with good water, or any other harmless liquid congenial with nature, the system continues in health and force if its food is not exhausted; but if this process of replenishing the stomach be delayed, particularly in very hot weather, until it be nearly empty and the cavity heated, to take in a quantity of cold water then, is as fatal as to put water in an empty red hot boiler of a steam engine, and thus be the cause of death. Therefore, if it so happens that a man cannot get water in time to replenish what nature requires, he ought, when he does obtain it, to have it blood warm, and thus fill the vacancy. But if he drinks, in time, before his store is exhausted, and the stomach becomes heated, there is no danger in drinking cold water, if it is good. Good water, as a drink between meals, will answer all that nature requires, and the quantity may be always measured by the appetite, provided it be done in time. Laboring men, and such as require a great deal of drink, ought to drink plentifully of water, or all they have an appetite for, in the evening after supper, for they will feel the benefit the next morning, by having a good appetite for breakfast, and not be much dry all the forenoon. L.

Improved Live Stock. By S. B. [For the New-York Farmer and American Gardener's Magazine.]

As every thing relating to improved live stock is doubtless interesting to the reading agriculturist, I should be wanting in duty not to mention a small stock which passed through this place on the 9th and 10th inst., belonging to Maj. Burroughs, a British officer, who, availing himself of the present season of general peace, is about to engage in the more retired and quiet pursuit of agriculture, for which purpose he was on his way to Ancaster, Upper Canada. The stock he had here consisted of

Beatrice, a Durham short horn cow, with her bull calf 9 months old, purchased of J. H. Powell, Philadelphia, for $600.

Annette, same breed, and bull calf, 4 weeks old, of A. Taintor, Hartford, Connecticut, for $300.

A heifer calf, one year old, one quarter China, and 3 quarters improved Durham short horn, bred by J. H. Powell.

They were all fine cattle; but of the cow Beatrice some idea may be formed by the size of her calf, which measured as follows: Length, from the top of the head to the rump, 6 feet 2 inches; height, on the shoulders, 4 feet 2½ inches; behind, 4 feet 3½ inches; girth, 5 feet 3 in.

Maj. Burroughs expects, with a part of his family, who are yet to come from England, an addition to his stock of some of the best cattle in England, and some of the Cheviot sheep, a breed similar to the improved South Downs, but said to produce finer wool. S. B.

Albany, June 11, 1835.

South Down Sheep. By S. Blydenburgh. [For the New-York Farmer and American Gardener's Magazine.]

I misunderstood the statement about Rotch's South Down sheep, and stated in my note on the subject (see New-York Farmer for last month, page 172), that they were raised by Mr. Rotch, the father of F. R. of Butternuts, and I am requested to have the error corrected, as the credit of raising the sheep is due to a Mr. Ellman, who has improved them from the former South Downs. I wish you would crowd the correction in some way into the July number.

S. Blydenburgh.

Albany, June 20, 1835.

By the following communication from R. M. W. it appears that he takes unkindly the remarks of the former editor of this work, in relation to a communication published in the last volume. The proprietor cannot believe, however, that the editor intended to "sneer" at the remarks of R. M. W., nor can R. M. W. accuse the editor of being "dull at the expense of reason and common sense," as the columns of the Farmer will show, conclusively, on referring to them, that he has always duly appreciated the frequent communications of R. M. W., and that they have occupied a prominent place in the work.

[For the New-York Farmer.]

"Remarks.—We wonder if this 'untutored' farmer stopped to inquire whether there be such a thing as 'carbonic acid

gas' to which his manure must be converted before his grain and corn could receive it into their capillary vessels?"—[N. Y. Farmer, Vol. 2, N. S., p. 137.]

MR. EDITOR,—The *profundity* of the above remarks might go unnoticed, but that they are calculated to mislead those who seek after *truth*. I presume the man of plain good sense, untutored in the schools, deemed it of some importance to prevent any fermentation in his manure, until it was applied to the soil, and therefore put in hogs to keep it stirring, probably knowing by experience that manure kept stirring is not liable to *fermentation*, but retains all its carbonic acid gas until it is applied and ploughed into the soil, when it imbibes proper moisture and heat, by which it is resolved into the food of plants in a proper state to be absorbed by the capillary vessels. It is easy to sneer at what we do not comprehend, and to be dull at the expense of reason and common sense; but these ingenious contrivances of college-bred students are not deemed very promotive of agricultural information.

Yours, &c. R. M. W.

Potter, April 22, 1835.

NEW PUBLICATIONS.

The Complete Farmer and Rural Economist, containing a Compendious Epitome of the most Important Branches of Agriculture and Rural Economy. By THOMAS G. FESSENDEN, Second Edition, Revised, Improved, and Enlarged.

This is the title and description of a neat duodecimo volume, of between 300 and 400 pages, (which we received some time since, but not in time for our last number,) concerning which, to those who duly appreciate the value, and relish the branches of agriculture, and who know Mr. F., as an author, tells the whole story. To those who have not the happiness to be thus qualified to judge of the merits of the book before us, we would say that agriculture as far surpasses all other arts as Nature, with all her strength, and arrayed in all her beauty, and still adorned by all the power of art, surpasses art alone; and that no man within our knowledge could do better justice to the subject than Mr. F., and we may still add that we think F. has never written with happier effect.

This work may be obtained of G. C. Thorburn, seedsman, and B. & S. Collins, booksellers, New-York.

From the above book, as it is the opinion of Mr. F., as well as of every other good agriculturist, that facts speak a stronger language than theories, we extract the following important fact, given by Mr. F., from the Rev. H. Colman.

Ruta Baga.—The following is an account of the method of cultivating ruta baga, adopted by Rev. Henry Colman, in obtaining a crop for which he received a premium of twenty dollars from the Massachusetts Agricultural Society, in the year 1830.

Gentlemen — Accompanying this you have the certificates of a crop of ruta baga raised this year on my farm in Lynn. From these it will appear that on an acre, measured by a sworn surveyor, on one side of the field, there were gathered seven hundred and forty-one baskets full; and that forty baskets of the above-named weighed at the town scales two thousand seven hundred and fifty pounds net weight. This, allowing fifty-six pounds to a bushel, the standard weight assumed by the society, would give a crop of nine hundred and three bushels to the acre.

The turnips were planted on the 29th of June and 2d of July; about one pound and a half of seed was used for the acre; and they were gathered and stored in cellars and in the barn, in the last part of November.

The ground on which they grew is a good soil, neither wet nor dry, and bore the last year an abundant crop of onions, and corn the year preceding the last. It was well manured at both times, and in fine tilth. It was manured with at least six cords to the acre of barn manure the last spring, and sowed again to onions; but the seed entirely failing, it was ploughed, harrowed, furrows struck out, and about eight cords of barn manure spread in the furrows; ploughed again, so as by a back furrow to form a ridge over the manure, and the seed sown with a small drill-harrow on the ridges, making the rows about twenty inches asunder. As soon as the plants were of sufficient size, a drill-harrow, with small shares fixed to it, to cut off all the weeds, was passed through the rows; and the plants thinned with a small weeding hoe to the distance of about eight inches apart, and the vacant places filled up by transplanting from the supernumerary plants. They were once more harrowed and cleaned, which was a very small labor; and owing to the very unpropitious weather, were not harvested until very late. Some of them were very large; one weighed fifteen pounds, and many were nearly as large. The exact expense of cultivating the acre cannot be estimated, as it was intermixed with other farm work; but the whole, from the sowing to the gathering, was not two-thirds of the labor usually bestowed on planting, cultivating, and gathering an acre of potatoes.

My Swedish turnips the last year, of which I raised considerable quantities, were fed off to my oxen, dry cows, young stock, and fatting sheep. To the cattle they were of very great advantage; and for feeding sheep, they proved the last year, by an accurate account, worth from ten to twelve and a half cents per bushel. The man who has the care of my stock considers them as among the most profitable feed which can be given either to fatting or to store cattle. Three years' experiment has increased their value very much for these purposes in my own estimation. I am, gentlemen, very respectfully yours,

HENRY COLMAN.

The Silkworm. Albany, May, 1835, Vol. I., No. 1. S. BLYDENBURGH, Editor and Proprietor.

We have been favored with the first number of the "Silkworm," a monthly periodical, published at Albany by Mr. S. Blydenburgh.

The design of the work is to disseminate information in relation to the culture of SILK; and it will be found well worthy of attention, especially to those who desire to engage in the business. It is published at Albany, once a month, at one dollar per year.

To the Public.—Our national progress in the useful arts and sciences is without a parallel. Within the short space of sixty years, we had no national existence, nor even a name; and it is fresh in the recollection of the elder class of our citizens, when in most of the arts of civilization, especially those connected with manufacturing, we were scarcely one remove ahead of the savage aborigines; when even our agriculture was hardly entitled to the name, and when the scanty overplus it afforded, would barely buy us knives and blankets. We are now in fair and open competition with the foremost nations on earth, in almost all that can exalt the human character, and before any other in some of the first essentials of human happiness. We have framed a system of government which is the subject of universal admiration, and which the world is struggling to imitate. The productions of our manufactories begin to embrace a respectable variety of articles, and of excellent quality; and our agriculture, though not foremest in the race of improvement, is now making the most cheering progress.

But as it is well known to every person of reflection that agriculture is the basis of all the useful arts, it must be gratifying to know that, with the help of a little mechanical ingenuity, it has, at one step, advanced the interest of the nation far more than any other single circumstance, by transforming cotton from a thing of no consequence to be the main pillar of our manufacturing interest, and the staple of our export trade; and it must be still more gratifying to know, what is an unquestionable fact, that the present state of our country presents a crisis which, if improved to advantage, will advance our standing beyond what was ever before experienced by this or any other nation at one remove.

It is well known that the article of silk forms the climax of richness in clothing. The introduction of this article into the most polished nations in Europe and western Asia required the lapse of numerous ages, and the expense of immense treasure, and even of blood. The price, for a long time, was its weight in gold; and a distinguished Roman Emperor refused his queen a dress, on account of its extravagance. At length, however, the eggs of the silkworm were obtained by stealth, and brought, concealed in a hollow cane, over mountains and through wildernesses, and trackless deserts, by a pilgrimage of nearly a year's travel. It is now fairly introduced into Europe,* and is manufactured to such an extent, that though large quantities of the raw material are produced, yet still

* The imports of silk into England for the years 1831 and 1832 stand thus:

	In 1831.	1832.
Raw silk from India,	1,725,650	
Cape of Good Hope,	26,930	
China,	8,374	
Turkey,	451,421	
Italy,	115,766	
France,	821,349	
Other countries,	85,375	
	3,235,865	3,391,721
Thrown silk,	629,281	177,066
	lbs. 3,865,146	3,568,787

more are imported from the Oriental nations and elsewhere. England alone imports annually above three million pounds weight, and four hundred thousand people earn their bread by manufacturing it; and twenty millions or more of dollars are annually expended in its manufacture in France, to great profit.

For this precious article, we are paying a yearly tribute of ten or twelve millions of dollars; and yet it is proved by the best judges, from numerous experiments, corroborated by a thousand circumstances, that this country is, above all others, congenial to the growth of silk. Its profit is infinitely greater than that of any other branch of agriculture; and what is of vastly more importance, it is not only peculiarly adapted to the care and management of females, and the labor also to be the employment of women and children, but it is connected with associations which exalt the mind and give a charm to the management, as well as to every part of the labor.

Ladies of the United States:

Permit me to address you with due respect on this important subject, and earnestly to entreat you to take under your care the guidance and protection of this most important branch of human industry. It seems as if the creative power had refined the article of silk, on purpose to fit it for your use; and connected its production with circumstances, not only to render it pleasing, but completely under your control. The silkworm was first domesticated by an empress, and the business has been nursed and fostered by females of the highest character.

If any lady, especially one who has daughters, and whose husband is a farmer with a hundred acres of land, and he will appropriate three acres to her use, and will give her the necessary assistance at the commencement in preparing the ground and sowing and dressing the mulberry trees, she will in three or four years be able to remunerate his trouble and to clothe herself and daughters in silk; and in five years and after, she will realize more net profit from her three acres than he will, by ordinary farming, from his ninety-seven; and her returns will be uniform, and in cash, while his will be fluctuating and uncertain. If the business be now entered into with spirit, in less than twenty years the tables will be completely turned;* many thousands of industrious people will be employed in manufacturing as well as producing silk; its importation will cease, and we shall export the raw material to a greater amount than we now import of that which is manufactured.

Culture and Management of the Mulberry.—The first step towards the production of silk is to provide a sufficient supply of the necessary food for the silkworms. This food has hitherto consisted mainly of the leaves of the tree which bears the white mulberry, which, though not a natural production of this country, appears to be, in an uncommon degree, suited to our soil and climate; and when introduced, flourishes in almost any part of the United States, from Canada to the Gulf of Florida.

There are various ways of propagating this tree, as 1st, from the seed; 2d, by cuttings; 3d, by grafting; 4th, by budding; 5th, by layers; 6th, by suckers. All these modes are resorted to in Europe and other parts of the world; but in this country, the cultivation is so easy and the growth so rapid, there seems to be little necessity for any other mode than raising from the seed.

The ground for sowing the seed and raising the seedlings requires to be very different from that on which the trees are ultimately to stand. The seedlings require a warm, rich, mellow soil, with a large proportion of mould; but the trees will flourish, and almost equally well, on any soil, where it is not too wet; but the leaves are said to afford more nourishment from trees that grow on poor land than on rich; a sandy or gravelly upland soil is most suitable; and the more stony the better, provided the trees have room to grow. But low marshy ground and stiff clay ought to be avoided.

The ground for sowing the seed should be ploughed in the preceding fall, and again two or three times in the spring; and one or two good dressings of manure will prepare it the better. The seed may be sown either in drills or broad-cast, but the best way is to form it into beds as you would do for onions or carrots.

The best time to sow the seed is as soon as the frost is completely out of the ground, and the ground is sufficiently dry to work to advantage; but it may be sown any time in the summer, if it has not been done before. But if sown late, care will be necessary to protect the seedlings from frost, during the winter, which may be done by covering them with straw or old dry hay. Indeed, it will not, perhaps, be labor lost to cover them in any case during the winter, until they are transplanted into the nursery.

If the seed be good, an ounce will produce from 5000 to 8000 plants, which will occupy a piece of ground, say one rod wide and two to three long. The seed should be soaked before sowing, two or three hours, in hot, but not boiling, water. Those which are good will sink to the bottom—the rest will float. The drills may be either crosswise or lengthwise of the beds; and a convenient way to make them is to lay down a piece of board about ten inches wide, and with a sharp stick, or any thing similar, scratch a little trench along the edge of the board, and sow the seed about three inches apart, and cover them with soft earth about a quarter of an inch deep: then carefully turn the board over forward, and sit or stand on it while you make and sow a second drill; and so on till you finish sowing. This will leave the beds smooth, and the earth sufficiently pressed down upon the seeds.

When the seedlings come up, the ground must be kept clean of weeds, until they are taken up for transplanting. If the ground is good, those sown in the spring will be from 6 to 12 inches high in the fall. They may be transplanted from the seed bed into the nursery in the fall; or what would be a better method, they may be put out of the way of frost, in a cellar, or any other safe place, and the roots covered with loam until spring. If they do not grow so large as to crowd in the seed bed, they may stand until the second fall or spring, or they may be thinned out by taking every other one. If the ground in the seed beds becomes hard, it ought to be stirred and softened, to render it more permeable to heat and moisture.

It will be evident to every person of reflection, that the young seedlings cannot with safety be taken from the beds and placed separately where they are to become trees; hence the necessity of placing them in the nursery.

In transplanting into the nursery it will be necessary to separate the large plants from the small, at least into two parcels—giving them room somewhat according to their size; and the smaller ones may be set so near together as to admit taking out every other one, when their growth shall require it.

There are three modes of disposing of the trees, in the situation where they are finally to remain: 1st, in shrubberies; 2d, in hedges; 3d, in orchards composed of standard trees. Probably standard trees in an orchard, where they have attained nearly their full size, may produce the greatest quantity of leaves, from a given space of ground.* But the small value of ground, in this country, renders this circumstance of little importance; and the inconvenience of gathering leaves from high trees, especially for females, is, probably, sufficient to overbalance any advantage which can arise from standard trees. But as there are many situations where trees can stand and where the ground will cost nothing, such as round the edges of fields, and along the roads; and as placing them in these situations will cost very little, it may be good economy not to neglect them. There will be also an objection to standard trees where shades are wanting, as stripping them of their leaves will, in that respect, render them useless. The same objection will also apply where a shrubbery is wanted. Probably the most advisable mode of cultivating the mulberry in this country is, either to fill up a field devoted to the purpose with hedgerows at proper distances, to admit of driving a horsecart between them, with a platform thereon, raised 3 or 4 feet above the cart; and to trim the trees in such form that a person may gather the highest leaves by standing on the platform; or, in addition to this mode, they may be so transplanted as to form hedges to fence all kinds of enclosures. Mr. Cobb observes in his Manual that "The white mulberry forms an excellent live fence, and when once established is the most permanent of any other. Cattle must not be allowed free access to the hedge while young, as they would destroy it altogether; but after it has become a good fence, they may approach it with advantage. The more it is broken

* This may as well be in 10 years as in 20.

* This, however, is doubtful.

down and lacerated by the cattle, the more impenetrable it will become; as for every branch broken, half a dozen shoots will immediately start out, till the bush becomes a perfect bramble. This mode is therefore recommended, as accomplishing three important objects: supplying food for the silkworms; keeping the trees low, that the leaves may be gathered from the ground by children; and furnishing a good and almost never ending fence. In transplanting young trees for hedges, they should not be pruned; but the second or at least the third year, the tops should be cut off, and the side branches trained laterally with the hedge by interweaving. When a field is set in hedgerows, all the branches within two feet, or at least eighteen inches of the ground, ought to be trimmed off, as the earth which spatters by heavy rains will lodge on them and render them unfit for use.

In transplanting the seedlings from the beds to the nursery or elsewhere, a sufficient hole may be made with a dibble or sharp stick. In filling an enclosed field with hedgerows, if it is thoroughly fenced, as it ought to be against all encroachments, the seedlings of two, or even one year old, may be transplanted into it immediately from the bed. The ground in that case should be made mellow by ploughing and harrowing, and the rows should be laid out by a line. The hedgerows should be a sufficient distance apart to give room, when the trees are branched out to the size intended, to drive a horse and cart between them. The trees should stand in the rows so far apart as to let them exercise their full vigor in growing; perhaps from two to two and a half feet. Until the trees are two or three years old, after transplanting, the ground between the rows may be occupied by potatoes, ruta bagas, or any similar crop, in dressing which, the loosening and working the ground will make the trees grow the faster. Occasional dressings of manure may be useful to forward the young trees, but should be discontinued afterwards, as the leaves which grow on poor ground are more nutricious and healthy to the worms and produce finer silk than those which grow in a rich soil.

In hedges for fencing enclosures, they may stand about 18 inches apart, and must be protected, as already stated, till they have grown too large to be cropt down by the cattle.

For standard trees they should stand in the nursery till they are about an inch diameter, and then be transplanted and managed in the same manner as other fruit trees.

In all cases, whether in the seed bed or elsewhere, if any branches or shoots are killed by frost, they should be trimmed off in the spring. In all other prunings, respect will of course be had to the object in view. In an enclosure set in hedgerows the tops will be trimmed down, and the sides so clipt off as to preserve a passage between them—and the most thrifty lateral branches trained and interwoven to the best advantage. When they are set in hedges for fencing, they should be cut off a few inches above the ground, leaving two principal buds or shoots to extend laterally and always on the same side, so that they may follow each other and be properly woven together. It is practised in some parts 'to sow the mulberry seed, broadcast, and when wanted for food, to mow down the young trees,' commencing when the trees are two years old, but this may be considered rather a slovenly practice.

It may be proper to caution persons who are anxious to progress in the business, against stripping the leaves from the seedlings and young trees until three or four years old; as in the first place the trees will doubtless be checked in their growth; and in the second place, the young leaves are said, by those who have had experience, to be unwholesome for the worms, producing a diarrhœa after the second moulting, though they do not disagree with them before. But as the worms are said to feed and thrive well on the leaves of the red and black mulberry, which grows spontaneously in many parts of the country, the first small stock of worms may be kept on that until the white is grown. The silk, in that case, will be coarse and poor, but it will be of no great consequence, with the small stock hatched the first season; and at the same time the prunings and clippings of the young trees may be fed to the young worms; and if even to the old, and should they prove a little injurious, enough will probably survive to produce a sufficient stock of eggs for the second year; but it would be best to give the leaves of the largest and oldest trees to the oldest worms.

But the great labor to be overcome in the silk business, indeed, the very foundation on which alone it can stand, is the introduction and cultivation of a sufficient supply of the food for the worms, which, as it cannot be effected short of two or three years, to any profitable extent, it is therefore of the more importance to begin immediately. But with the worms, the case is different. A sufficient number of eggs can at any time be obtained by mail to produce the second year a million of worms. Therefore, though it would be well to have a few worms the first year, in order to get acquainted with their operations, and the manner of taking care of them, it would not be advisable to go farther, or make any calculation on producing silk to profit. If properly managed, the profits will begin to be of importance the third year, and, from that time, constantly increasing as the trees grow and the business is consequently extended. The main attention, during the first and second years, is required to bring forward the mulberry trees, and to get duly acquainted with managing the worms.

PROFITS OF THE MULBERRY, WHEN APPLIED TO THE PRODUCTION OF SILK.—Though it would seem probable that almost any farmer, who has 100 acres, or more, if he understood the subject, and was duly informed as to the profits of cultivating silk, would appropriate at least three acres to it, I will confine my calculation on the profits to a single acre, which the farmer can always extend or contract to suit his own views.

A number of calculations have been given to the public, by different persons, all founded on experience, and probably all true. But as they have been made on different soils, and no doubt with different management and different degrees of skill and care, as naturally to be expected, they all differ. Probably the mean between them may be relied on as a fair average result.

Andrew Palmatier, Esq., of New-York, has given a statement from two acres, which, divided, will give the following for one acre:

One acre of ground, fenced by mulberry hedges and set out with trees,	$250
Interest and additional expense during 5 years,	187,50
	437,50

The acre will then produce:

From 5 to 10 years,	20 per cent.
" 10 to 15	47 "
" 15 to 20	*112 "

which will average nearly 45 per cent. for the first 20 years, and continue at 112 per cent. afterwards.

Mr. Fitch, who is cited as authority by the Secretary of the Treasury, calculates 40 pounds of silk to an acre, and Mr. Storrs 60 pounds.

According to the calculation of Mr. Palmatier an acre will pay on an average of the first 20 years $205,62, and $490 a year afterwards.

Mr. Fitch's statement, allowing the silk to be worth $4 per pound, would yield a gross amount of $160, and that of Mr. Storrs $240. Mr. Storrs has had much experience, and probably his estimate may be relied on as the average; though in a better soil, some one may have gone far beyond it.

Thus far we are indebted to No. 1 of the "Silkworm," upon which we have drawn largely—we have, however, taken even greater liberties with No. 2, which has just reached us, as will be perceived by a reference to the following columns, in which will be found engravings representing the silkworm in its various ages, until the cocoon is completed.

We ask for this an attentive perusal, as it cannot have escaped even the most careless observer, that the silk business is to become an important and leading business in this country.

It is the intention of the "Farmer" to follow this SILKWORM through all its changes, and to give a minute description of every thing pertaining to it, and to the various operations in preparing its produce for the market.

We shall give further extracts from the "Silkworm" in each succeeding number.

[From No. 2 of "The Silkworm."]

Those who have read the first number of the "Silkworm" will have discovered, that the object of its publication is to give from

* If the trees are set in hedgerows, ten years will produce the full effects.

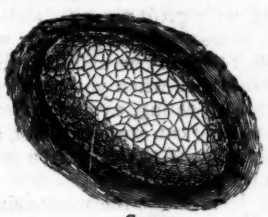
Second age of the Worm.

Third age of the Worm.

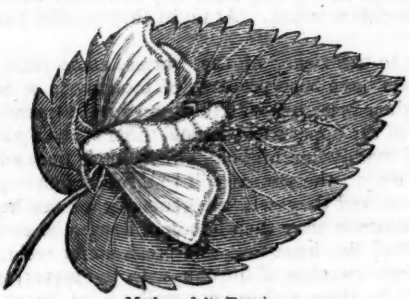
Fourth Age of the Worm.

Fifth Age of the Worm.

Moth.



Cocoon.



Moth and its Eggs.

time to time, in regular and succinct progression, such information as should be necessary and sufficient, if duly followed, to insure success, in the production of the raw material of silk, in proper order for market, at home or abroad; and also, so far to introduce the manufacture of it, as should fairly open the door to unlimited improvement. The public mind seems peculiarly awake to this interesting subject, and I think there is but one obstacle which can seriously interrupt its progress; and that obstacle I will now endeavor to point out, hoping that, by giving timely notice of it, I may be instrumental, at least in some degree, in counteracting its effects.

Nothing can be done, to any valuable purpose, towards producing and managing silkworms, until the person doing, or attempting to do it, shall be furnished with an ample supply of mulberry leaves to feed them. Without this, one might just as well open a boarding-house with nothing to eat. This can not be effected to much profit until, at least, the third or fourth year. The strong excitement now every-where exhibited to engage in the business, will soon reach, if it has not already reached, the height of its ardor; and such excitements, unless the stimulus which produces the mbe duly kept up, are like "hot love,"—they soon cool.

Many will engage in the business, with a degree of enthusiasm, without food for the worms, skill to manage them. Ill success, disappointment, discouragement, and disgust with the business, will follow in succession; and where ardor in any cause is once followed by disgust, or even by discouragement, it is doubtful whether it can ever be excited again.

To avert so serious an evil, it will be necessary that every one about to engage in the production of silk, if not possessed of the requisite knowledge, either from previous experience, or from information skillfully given and carefully attended to, should, previously to commencing, set about procuring such knowledge, as to the preparations necessary to be made, the time it will require to make them, and also of all the operations to be gone through, the accidents and disasters liable to occur, and the precautions necessary to avoid them and the means to remedy them.

To communicate this information, in season to prevent any re-action of public feeling for want of it, is the object of the "Silkworm," not by selecting promiscuous extracts, as is the common practice in making up periodicals, but by collecting information from every authenticated source, particularly from experience; and after selecting what is essential and absolutely useful to the business in this country, and rejecting what is not, to digest and arrange the information so collected in such manner as to form, at the end of each year, a systematic treatise or general manual on the subject.

I shall now presuppose that the instructions given in the first number have been duly followed: that the ground has been properly prepared, and that good seed have been procured and sowed in quantities to meet the calculations for future business; that as the seeds came up, proper care has been taken to exterminate the weeds, and loosen the ground round the young seedlings, and, if dry, occasionally to water them.

As soon as the mulberry trees are properly disposed, in a growing and thrifty state, the next thing, in the regular order of business, will be to form some acquaintance with the natural history of the silkworm.

It will not be necessary for the silk culturist to become acquainted with all the hard words which compose the technical vocabulary of entomology or botany. The worm appears to have no partiality for Greek or Latin, being apparently just as well pleased to be called *silkworm* in plain English, as with its Greek name *bambix*, and does not seem to care whether you present its food by the name of white or Chinese mulberry, or by the more learned cognomen of Morus alba or of Morus multicaulis.

Probably the first acquaintance the newly engaged silk culturist will have with the silkworm, will be in the form of eggs, resembling a small round seed. These eggs when first produced are of a pale yellow color, but in two or three days turn to a light slate or ash color, and afterwards to a dull or brownish slate color. Those which remain yellow have not been fecundated, and of course will not produce worms; the white eggs, if there be any, have already produced. These eggs will remain in the same state so long as they are kept in a dry place, with a temperature between freezing and 55 degrees of heat, or common spring weather. When exposed to proper heat, they hatch and produce a little worm, about as large as a common sewing thread, from an eighth to a quarter of an inch long.

This worm grows and requires food about 32 or 33 days, during which time it sheds its skin generally 4 times, and is then about 3 inches long. These sheddings of the skin are called moultings, and the periods between them are called *ages*, or sometimes *stages*; but for the sake of uniformity, ages is the best term; so that there are 4 moultings and 5 ages. The first moulting generally happens about the 5th day, the second on the 8th, the third on the 13th and 14th, and the fourth and last on the 22d.

About the 32d day the worms cease eating, and prepare to wind themselves up, and this is called *rising*; and in about 8 days the whole stock will be wound up in separate balls of fine silk, each perhaps a little larger than a robin's egg, and of nearly the same shape. These balls are called cocoons. In from one to three weeks there will come out of each cocoon, if not prevented, what is commonly called a moth or grub, a kind of clumsy looking butterfly, of a greyish white, incapable of flying, and covered over with a downy substance.

These moths are male and female, and as soon after as the sexes can get together in pairs, they exercise their sexual powers upon each other, and in 24 to 36 hours the females begin laying, and lay about from 300 to 400 eggs each, after which the moths die, thus completing the circle of their existence, and preparing for a succeeding generation.

Having thus become a little familiar with the forms, changes,

and appearances, of the silkworm, the adventurer may commence with a very small stock of eggs, and proceed according to the following directions, which are copied, with some abridgment, from the excellent little work of Mr. Cobb, entitled the "Silk Manual."

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The advance of the season determines the time of hatching the eggs. As soon as the leaf of the mulberry begins to unfold —which is generally in this climate (New-England, New-York, &c.) the latter part of May—and you observe that there is a prospect of having a sufficient quantity of food, it is time to expose the eggs to hatch. No other process is necessary than to expose them to the air in a room; they hatch voluntarily in a day or two after the exposure.

It is best to preserve those insects for rearing, that come out as nearly at the same time as possible. As soon as the worms begin to appear, lay over them young and tender mulberry leaves; they will soon attach themselves to the leaves, and by taking hold of the stems of the leaves you may remove them easily. They ought now to be supplied with fresh tender leaves three times a day. As the leaves when very young will dry so much in a short time if exposed to the air as to be unfit for use, you may put them in a glazed vessel or keep them covered in a cellar or cool place; by which means the leaves may be kept good for two or three days. Besides, it is well to have always in your house, at a time, a stock of leaves sufficient at least for three days' provision for your worms in case of wet weather. If leaves are given when wet, they will cause disease. Be careful never to pull the leaves when wet, either with rain or dew, except on absolute necessity, and in that case you must spread them and turn them, that the leaves may be perfectly dry before you give them to the worms.

In Europe, laboratories have been constructed with great care and expense; but however convenient these may be, they are by no means necessary to success in rearing silkworms; almost any building will answer for that purpose. I have reared them myself with success in a barn, in my cellar kitchen, and other rooms of my dwelling-house, and in the lower story of Tremont House, in Boston. It was found in France that the cocoons brought to market by the peasants, raised in hovels so full of cracks as easily to be seen through and to admit the air freely, were richer and heavier than those reared in palaces and in the confined rooms of dwellings in cities.

I have used three tiers of rough pine boards fixed upon upright posts, about four feet in width, one above the other, with a space between of two and a half feet, affording room sufficient to pass all around the frame, so that I could conveniently reach any part of it. In making the shelves, it is well to have the lowest one six inches broader than the one above it, and to make the same difference in the other shelves above, so as to break the fall of such worms as happen to tumble down.

Too many leaves should not be given to them at once, and the leaves given should be spread very thin, because if put on too thick, a great number of the worms when small will run the risk of being lost and carried out among the litter. When the worms are in the first age, you need only clean the litter once or twice, as you find it necessary. During the whole of the first age, the leaves of the young plants of the mulberry, as being the tenderest, are preferable to the leaves of older trees for the food of the young worms. It is well, therefore, to sow some mulberry seed every year, so as to have a succession of young plants. During the temporary sickness produced by the changing of the skin, they should be fed with a very sparing hand. The signs by which it is known that worms are sick and about to change their skins, are these: they hold their heads up, are motionless, and appear to sleep. This should be noticed.

During the second age it is advisable still to continue to feed your worms with leaves from the young plants, as they are still preferable for them. You must now begin to be attentive to clear away the litter from time to time, so as to prevent all danger from its heating, which proves highly injurious, though some people never clear away the litter at all. These insects are remarkably fond of cleanliness, which besides helps to enliven them, and gives them a keen appetite for the leaves that are given them. The litter is taken away in the following manner: you scatter some fresh leaves upon one corner of the shelf, to which the worms having attached themselves, which they will readily do, you then take up the worms by means of the leaves and stalks they cling to, leaving the litter underneath. Having thus taken up all the worms from that corner and placed them in a clean place, you then clear away the litter from that corner and carefully sweep together with a little broom or wing all the dirt, which you remove: you then remove the worms next adjoining to the clean place thus prepared and put them into it; in this manner you proceed with the rest.

During the third age the full grown leaves of the largest trees may be given—though it would be well to reserve the largest and toughest leaves till the last age, when they are the most voracious. During the third age, the litter should be removed at least three or four times; worms that die, or appear to be diseased, should be immediately removed.

The same treatment will be required during the fourth and fifth ages as in the preceding. As they advance in age the greater will be the proportion of food required and the oftener the litter must be removed; by these means the process is sooner brought to a conclusion, and the worms always kept in high health and appetite. During the four or five days previous to their rising, the worms consume an incredible quantity of leaves, eating with great voracity, and at this time the labor of tending them is most fatiguing. You will know when the worms are ripe or ready to rise and form their cocoons, by observing them with attention when you give fresh leaves. Those that are ripe, instead of eating, avoid the fresh leaves, and run over them as fast as they can wander about, and try to climb; they will look transparent, of the color of a green gage plum, and somewhat diminished in size.

In the fifth age the worms should have new leaves as often as the old ones are consumed, until they are observed to creep on the leaves without eating. At night they should have a double portion.

Previous to the rising of the worms, some little arches or cabins should have been prepared of brushwood or broom corn, by setting their branches with their top spread pressing against the bottom of the upper shelf, to hold them in their position. The worms will readily find and climb these little trees and spin their cocoons in them; the worms will be three or four days spinning their cocoons, and they will all generally be finished in eight days. The brush may then be taken down, the cocoons taken off, cleared of the loose tow, and prepared for reeling. I have found that the branches of the oak, with the leaves on, answered the purpose for these arches very well, as the leaves are strong and do not crumble in taking off the silk. They should be cut some days before hand, and be dry when used.

DESTROYING WORMS AND INSECTS WITH SPIRITS OF TURPENTINE.—I was led to try it by observing that certain plants which have naturally a strong odor, are not infested with insects.

Wishing some years ago to raise four young puppies, I perceived them when a few days old to be very languishing, and discovered that they were full of insects or lice, which were preying upon them. It was in vain that they were combed—new generations succeeded, or were renewed from the mother, and the little animals were on the point of perishing. I then took it into my head to sponge both the mother and the pups with warm water, impregnated with spirits of turpentine: and soon found to my agreeable surprise, that every turn of the comb brought out numerous dead insects. The little animals soon acquired vigor, and were saved by a single repetition of the process during the course of the summer.

I soon found occasion to try its effects on some of my trees, which were attacked by a multitude of worms. These I destroyed entirely by putting into a bowl a few handfuls of earth on which I poured a small quantity of the spirits — then adding water, and stirring the whole together, until it had a proper consistence to be rubbed or brushed over the ends of the branches. The insects perished with their germs, and the odor remaining several days about the tree, repels fresh invaders. A mixture of earth is necessary, because spirits of turpentine swims upon pure water and will not mix with it; and if used in too great quantities, might burn the leaves.

The drought which occurred a few years ago, in the canton in which I live, produced a mange in horses and cattle,

very extensive and injurious; and those which escaped this infection were filled with lice, from which they were promptly relieved by sponging each with water impregnated with the spirits. This infection caused horses fatigued with labor to rub themselves so much against their mangers, and the walls of the stables, as to deprive them of much of the rest so necessary to their comfort.

I cannot therefore doubt, from the trials that have been made, that much benefit might result from the use of turpentine in clearing fields and trees from insects of different kinds: and that a mixture of ashes with which a portion of this liquid has been incorporated, would remove, by its odor the ticks and other insects which infest turnips. Its odor is more penetrating in the open air than that of sulphur and some other materials used for this purpose. —[Silliman's Journal.]

NEW-YORK FARMER.

JULY 1, 1835.

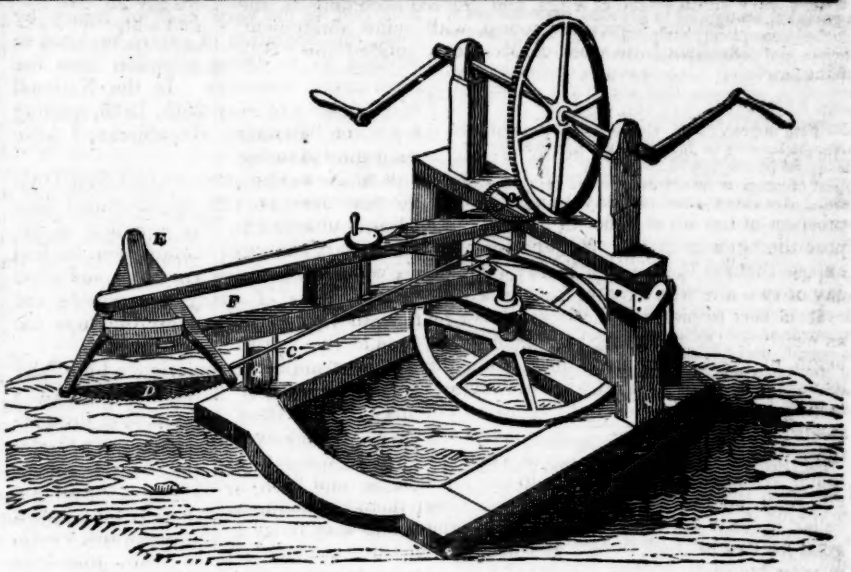
FELLING TREES BY MACHINERY.—Mr. James Hamilton, of this city, the inventor of a machine for *sawing* and *boring* for mechanical and other purposes, and for which he obtained a patent as well in England, Ireland, Scotland, and France, as in the United States, has recently invented a machine for *felling trees* in the forest, in which he has succeeded even beyond his most sanguine anticipations; and which will, I have no doubt, prove a valuable labor-saving machine to the settlers of new countries, and even where it is partially settled.

This machine requires very little more space for use, than is required to swing an axe; and it may be used in almost any situation where a man can use an axe. It may be moved by one man, from tree to tree, with great facility, (although two men will work it to better advantage,) who can cut a tree of 20 to 24 inches diameter in five minutes, and larger ones in proportion. The machine is so constructed as to admit the use of a saw of 3, 4, 6, or even 9 feet in length, according to the size of the tree.

Such is the construction of the machine, and it may be considered as one of its peculiar qualities, that the more rapid its motion, the less power is required to keep it in motion—or, in other words, by the use of a horizontal fly-wheel, which is placed near the ground-sills of the frame, the machine may be made to perform 250 to 300 strokes per minute, each of which shall cut upon an average at least 1-20th of an inch, or at the rate of 8 to 12 inches per minute, on an ordinary sized tree—thereby producing great execution with very little labor.

The simplicity of this machine is such that there is little danger of its getting out of order; and ample means are provided to prevent accidents from the falling of the trees.

However great may be the advantage of this machine for ordinary use, or for clearing of land for cultivation, in the saving of time, it will be found even more valuable for the purpose of cutting trees for timber; as it will always leave a square and uninjured but, and save the labor and loss of timber; which always results from squaring the end when chopped in the usual mode. In cutting mahogany trees especially, the most valuable part of which is near the root, it will be found of great value. Mr Hamilton is certainly entitled to much credit for his efforts to facilitate this, the first and most laborious part of the husbandman's labors. None but those who have had experience can appreciate the toil of this labor in a new country; none therefore but such, and not even those until they have used it, can appreciate the value of this invention. In order, however, to give the readers of the Magazine a better idea than they can derive from any written description, a representation, a perspective view of the machine, is given herewith, from which, although accompanied by but few references, any person familiar with machinery will readily understand its operation.



References—A, principal wheel, to which the power is applied; B, perpendicular shaft; C, rod connecting the saw, D, with crank shaft; E, pivot on which the saw vibrates; F, frame, revolving on perpendicular shaft, which supports the saw; G, small roller, between the saw frame and the front sill of the machine, to support and keep the saw level

Annexed we give the report of a Committee of the American Institute of this city, showing the estimation in which it is held by that body.

We shall take occasion hereafter again to refer to this machine, and shall take pleasure in recording its performances for the benefit of both the public and the patentee, who deserves well of his countrymen for his inventions of labor-saving machinery.

AMERICAN INSTITUTE, Clinton Hall,
City of N. York, June 25, 1835.

The Committee to whom was referred the improved Machine, invented by Mr. James Hamilton, of this City, for felling trees, report:

That this invention of Mr. Hamilton is one of great public utility, not only in clearing land of trees, but in felling timber trees for naval and civil architecture.

It cuts the stumps uniformly of an equal height, and at least 12 or 16 inches closer to the ground than is usual, the stumps being left with a horizontal surface; having been cut with a saw, and absorbing more moisture than when cut with the axe, the stumps will decay much faster.

Much of the most valuable part of the timber also is saved in cutting close to the ground, and the end of the timber is square when felled, thus saving the additional time and trouble necessary, in the ordinary way of felling, to prepare it for the mill by butting.

The Machine is simple in its construction, and may be worked by one or two men. It can be built for about $50. *It is believed that two men may fell by this machine as much in a given time as twenty can by the ordinary way.* Sufficient provisions are made to prevent the tree from falling on the machine, and to prevent the saw from being pinched.

A tree of 2 feet diameter can be cut with it in five minutes by the power of one man, and with a saw proportionally larger, trees of any magnitude may be cut with ease. This Machine is about three feet wide and four feet long, and is easily moved from tree to tree, as it runs on small wheels.

Your Committee consider this Machine worthy of being mentioned with commendation to the Government of the United States, and to all persons who have occasion to fell trees, either for clearing of land, or for timber.

GEORGE SULLIVAN,
ROBERT NEWELL,
JAMES F. KENNEY, } Committee.

I certify that the report, of which the above is a true copy, was adopted at a meeting of the American Institute, June 25, 1835.

EDWIN WILLIAMS, Rec. Sec.

THE ARMY WORM.—Some of the Western papers are loud in their complaints of the ravages of a destructive worm, called the Army Worm. It is particularly injurious to rye fields and meadows, according to the Maysville Eagle, which states that

a grass lot, contiguous to the road, near that town, has been completely stripped of leaves by these voracious and destructive foragers. A correspondent of the Cincinnati Gazette, dating from Anderson township, mentions that the Army Worm has made its appearance in that neighborhood to an alarming degree. He mentions a meadow of eight acres, belonging to himself, that has literally been devoured by them, and they were on the march in quest of other subsistence. Great fears were entertained among the farmers as to the probable extent of the ravages of this worm. When first discovered, it is said to be about an inch in length, rather slender, of a dark brown (varying to black), with white streaks on the side—the head of an amber color and as hard as flint. In five or six days' time they acquire the full size, and are then upwards of two inches in length. At this period, it is said, one of these worms will eat a large blade of grass in a couple of minutes. Wherev r they appear, it is in great force, and hence are called *Army* Worms.—[Baltimore Patriot.]

[From the National Intelligencer.]

PEACH TREES.—This modest and beautiful tree, the parent of one of the most delicious of all fruits, is, if properly managed, perhaps the most easily cultivated and preserved of all fruit trees. To sustain these observations, I mention my own experience. On a rented farm, and on which I resided near ten years, I found but one good thriving peach tree when I took possession, and only a few stocks of that tree in any condition. Regarding it a duty which every man owes to society, to plant fruit trees if in his power, I commenced raising the peach from the stone, and persevered in that plan during nine seasons, and left a considerable number of the very finest peach trees in the highest state of health when I removed.

There is no one other fact in natural history, of the truth of which I am more convinced, than that the peach tree would, in any part of the middle or southern States, flourish, if three rules were observed:

1st—Plant the seed annually, so as to have new plants to set out annually; or, what is much better, plant the seed where the tree is to stand.

2nd—Whenever the tree commences to decay, cut it down as near the ground as possible.

3rd—Plant the peach tree in your best soil, and work the ground around where it stands.

In the public prints, we see this season, from all quarters, accounts of the destruction of the peach tree by the frosts of last winter. In some cases the body of the tree is said to be killed, while the roots are living.

The peach tree is evidently a native of a much warmer climate than that of the central United States. In Louisiana, Mississippi, and Florida, I have seen it in flower, and in leaf partially, at every winter month. It is of course in the southern section of the United States an imperfect evergreen. In all situations and climates where I have seen it growing, from N. lat. 29 deg. to 45 deg. it is a tender tree and demands care; but with care and skill, there is no other tree which yields to man a more grateful and certain return.

Similar to all organized beings, when wounded by any adverse cause, the peach tree exerts the principles of life, or more distinctly the principles of self-preservation, and, in the very case of injury by frost, this operation of nature becomes so striking as to arrest attention from the most casual observer. In the National Intelligencer of May 28th, 1835, quoting from the Wyoming Republican, I have read the following:

"A few weeks since we mentioned that the peach trees in this neighborhood were generally killed by the coldness of the winter. Upon close examination, we find the roots of the trees are alive, and some of the limbs of many are putting out leaves; though in general the tops are dead."

Now, from actual experience I am fully convinced, that, if those trees, the roots of which are alive, and exerting their resources to save the branches, were relieved by amputation of the whole tree to within one, two, or three inches of the ground, that numerous fine healthy young stems would be seen rising, and which, in two, or at most three years, would be loaded with fruit. This statement is made from actual experiment, within twenty miles from your office, and never failed in a single instance. The preservation of the tree in this case is very greatly enhanced by keeping the ground loose and clear of weeds near the roots.

Let me, in conclusion, say to the Farmer, plant the seed of peach annually, keep the ground cultivated around the root, and when, by any means, the stock is found in a decaying state, cut it away, and leave the root to expend its resources on the production of new scions, and one of the most ornamental trees and most delicious fruits may be secured with almost unerring certainty. A TRAVELLER.

[The above is from a practical gentleman well known to the editors.]

[From the American Gardener's Magazine.]

On Budding Trees and Shrubs. By the CONDUCTORS. *To which is added, the different modes of Budding; and of Herbaceous, or Summer Grafting, extracted from Loudon's Gardener's Magazine.*

The propagation and multiplication of the different species and varieties of trees, shrubs, and plants, especially kinds of delicate growth, is, we believe, quite imperfectly understood, in this country. The common methods of grafting and budding have long been in practice, as almost the only means of increasing plants, unless it were those which propagate easily from cuttings, suckers, or division of the root. We have lately observed in some of the nurseries which we have visited, several methods in practice which were quite new to us, and which we should think, from the success attending the practice, would, if become extensively known, be the means of greatly facilitating the multiplication of many delicate kinds, which it has been found exceedingly difficult to increase to any extent.

With trees, the common method of grafting is generally adopted, and in budding, the old system is almost universally pursued. Very few attempts have been made to render practicable and successful many of the new and more recent methods, laid down in most horticultural books, more particularly those in use by the French, who far excel even the English horticulturists in the multiplication of plants; this is owing to their knowledge in vegetable physiology, and to the various experiments which they are continually making for the discovery of some new method.

The following article we have extracted from Loudon's Magazine, with the hope that it will suggest some new ideas, as well as present some new methods, upon budding and herbaceous grafting, which will not fail to be of great benefit to individuals, as well as to the public in general. It was translated from a Belgium work, by Mr. Loudon, the indefatigable editor of the Gard. Mag., with some additions and alterations; but as we are sure it will be one of the most interesting articles in our present number, we present it entire.

"The following article we have translated, with some additions and variations, from *l'Horticulteur Belge;* and we present it to our readers as more complete than any article which has hitherto appeared on budding and herbaceous grafting in the English language. We have given the French names of the different kinds, both of budding and grafting; not only because we think the doing so will be useful to gardeners who visit the Continent, or read French books on gardening, but because many of the terms are not translated literally. For example, the French apply the word *greffe* (graft) as a generic term, including both grafting and budding; whereas the English, and also the Germans, use distinct words for these two kinds of operations. The Germans use the word *veredlung*, ennobling or improving, as including both grafting, *propfen*, and budding, *ocurliren*. In English we have no gardening word to express the two operations, although the word incision might be used for this purpose.¶

I. BUDDING. *Greffes par Gemmes.*

1. *Escutcheon Budding, without a Bud or Eye; Greffe en E'cusson sans Yeux.*—The object of this mode of budding is simply to cover a wound or blemish in one tree by the live bark of another. Take from a tree of the same sort, or at least of the same genus, as the wounded tree, a piece of bark rather larger than the wound, and form it into a regular shape; then cut the bark round the wound into the exact form and dimensions of the piece to be inserted, so that the latter may be let into the former with the greatest exactness. The inner bark of the graft and that of the stock being fitted so as to joint perfectly all round, and the shield closely adhering to the tree in every part, it is kept on by a ligature; and the edges of the wound are covered with grafting-wax or clay. It is a remarkable fact, which some are, perhaps, not aware of, that the wood formed under a piece of bark inserted in this manner, even though that bark be without a bud or eye, will be the wood of the tree from which the shield was taken. In this way several different kinds of wood might be formed on one tree, without introducing a single leaf belonging to those different woods. The portion of wood introduced will always be limited in diameter to the size of the portion of bark put on.

2. *Budding with a Bud or Eye, and a circular Escutcheon; Greffe en E'cusson par Inoculation.*—With the point of a grafting-knife, or rather with that of a penknife, cut a small bud out of the tree to be propagated, leaving a narrow rim of bark round it, and taking, at the same time, a portion of the wood, which is retained. A hole is made in the stock, of the same size as the bud and its rim, and of a depth equal to the

length of the piece of wood left on. The whole is adjusted so that the bud, with its bark and wood, fills up the wound exactly; and the edges are then covered with grafting-wax. This mode of budding is employed to equalize the flower-buds over a tree, by removing some, from where there are too many, to those parts of the tree where there are too few.

3. *Escutcheon Budding with Wood under the Bark; Greffe en E'cusson boise,* (*fig.* 6.)—To procure the escutcheon, a deep and transversal incision is made above a healthy and vigorous bud; then, by withdrawing the blade of the grafting-knife, and entering it rather higher than this cross cut, a narrow strip of bark, three or four lines broad, by 1 in. or 1½ in. long, is taken away, terminating in a point at the bottom.

The eye should be situated about a third from the top, and the stipules, or other appendages that sometimes accompany the petiole, as well as prickles, &c., must be taken off with caution. With the point of the grafting-knife, the wood of the escutcheon is then taken out, leaving a small piece immediately under the eye, and about a third of the length of the escutcheon. The bud, thus prepared, is inserted in the stock, and then tied as before. This mode of budding is that most generally used in European nurseries.

4. *Escutcheon Budding, with a growing Bud; Greffe en E'cusson avec un Œil poussant.*—The escutcheon is cut, and placed in the same manner as by the preceding method; but, as soon as it is inserted, the head of the stock is cut off, and all the buds that push from it, except that from the escutcheon, are rubbed off as they appear. This mode of budding, when done in the spring, has the great advantage of forcing the bud to develope itself immediately, thus gaining a year. However, it sometimes happens that, if the bud does not take, the sap of the stock not being able to find a channel, from all the shoots being rubbed off as they appear, the stock, or at least a great part of its length, dies of repletion. When done in the month of August, this mode of budding seldom succeeds, because the young shoot, not having time to ripen, perishes with the frost, and often causes the death of the stock.

5. *Escutcheon Budding, with a dormant Bud; Greffe en E'cusson avec un Œil dormant.*—This mode is similar to the preceding; but it is performed in August, and nothing is cut away from the stock till the following spring, in order to prevent the developement of the bud before that season. Though longer before it takes effect, this mode of budding is more certain to succeed than the preceding method. It has also the merit of not hurting the stock, if it does not take. The inhabitants of Vitry, who carry on the greatest commerce in fruit trees in the neighborhood of Paris, use it almost exclusively. This mode is that generally used in the British nurseries.

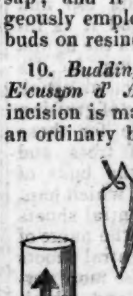
6. *Escutcheon Budding, without the Wood; Greffe en E'cusson denue de Bois.*—According to this mode, all the wood is taken away except a speck immediately under the bud; to the life of which bud, however, that speck is essential. The rest of the process is as usual. Besides being very suitable for orange trees, this mode of budding is used for all trees having hard wood, such as myrtles, hollies, and all analagous species, whether indigenous or exotic. It can be done either with the growing bud or dormant bud.

7. *Escutcheon Budding, with Pincers; Greffe en E'cusson a Emporte-piece.*—A pair of pincers ought to be made on purpose, with which a piece of bark is taken off the stock. With the same instrument, or with the blade of the grafting-knife, an escutcheon or plate of bark, having a vigorous eye in its centre, is taken off a young shoot of the tree to be propagated. It must be exactly of the same size as the wound made in the stock, in order to fill it with the greatest precision. When it is properly fixed, it is supported by means of grafting-wax or soft wax. This method is excellent for budding old trees, the thick and rugged bark of which is not suitable for the ordinary modes.

8. *Escutcheon Budding, with the Eye turned downwards; Greffe en E'cusson a Rebours.*—The escutcheon is cut in such a manner that the point of the eye, when placed on the stock, is turned downwards, whether the incision in the stock is made in the usual manner, or like a T reversed, thus, ⊥. By this method, the buds are forced to grow in a direction opposite to that which they would have taken naturally; but they soon resume their usual position; and the desired end, viz., that of increasing the size of the fruit by stagnating the returning sap, is thus by no means attained.

9. *Reversed Escutcheon Budding; Greffe en E'cusson renverse,* (*fig.* 7.)—The escutcheon is prepared in the form of a triangle; but, instead of bringing it to a point under the eye, it is pointed above it. It will be perceived that the incision in the bark of the stock must be also reversed; that is to say, instead of being in the form of an upright T, it must be like a T turned upside down, as in the figure. To effect this, the longitudinal incision is made above the transversal one, instead of making it below it. It is finished with ligaments and grafting-wax, as the preceding modes. In comparatively cool and moist climates, like that of Britain, the grafting-wax may be dispensed with in such cases as this and the three or four preceding ones. This manner of budding is almost the only one used in the south of Europe, particularly at Genoa and at Hieres, to multiply orange trees. It is also suitable for the propagation of trees having abundant and gummy sap; and it might probably be advantageously employed to secure the success of buds on resinous trees.

10. *Budding resinous Trees; Greffe en E'cusson d' Arbres resineux,* (*fig.* 8.)—An incision is made in the form of T, as if for an ordinary bud, in the bark of the stock. A double incision is then made obliquely, about two lines or two lines and a half from the upper part of the T: this incision should penetrate the bark to the thickness of nearly a line, or so as to reach the soft wood. This mode of budding succeeds not only on resinous trees, but also on all those that have a gummy and very abundant sap.



11. *Covered Budding; Greffe en E'cusson couvert,* (*fig.* 9.)—The bud is prepared as usual; but, when it is inserted in the stock, instead of a ligature, the lines of junction are covered with grafting-wax: a piece of bark is then taken from another tree, and, a small hole being made in the middle of it, it is placed on the escutcheon, so as to cover the whole of it except the bud, which appears through the hole, as in the figure. A bandage is then put over the bark, to keep the whole together. This mode of budding is rather too intricate for ordinary purposes; but it may be worth adopting for rare and delicate trees.

12. *Budding with a square Escutcheon; Greffe en E'cusson carre.*—Three incisions are made in the stock, one transversal, and the two others longitudinal, beginning on each side of the horizontal one, and descending perpendicularly four or five lines. They are to be four or five lines apart, and to represent a long square, the bottom line of which is wanting. This square strip or plate is raised and turned down. A square escutcheon, provided with a good eye, is then cut from a branch of the tree which is to be propagated, exactly of the same size as the plate stripped down the stock; and it is applied to the incision, which it must cover with the greatest exactness. This being done, the plate of bark, which was hanging down on the stock, is raised, and the escutcheon covered up to the eye; the line of junction is then coated with grafting-wax, and the whole is tied like other buds. It appears that this mode of budding was much used formerly, and that it succeeded perfectly; but, as it is rather tedious in the execution, it is now seldom employed.

13. *Escutcheon Budding, with a Portion of Terminal Buds; Greffe en E'cusson par Portion d' Yeux terminaux,* (*fig.* 10.)—A piece, measuring six or eight lines in length, cut from the top of a branch, is split in two, dividing the terminal bud exactly in the middle. An incision is then made in the stock in the form of a T, and the half bud is inserted into it in the usual manner. In case of need, the terminal eye might be divided into four equal parts. The growing bud ought to be used to insure success, though this mode will sometimes succeed with a dormant bud. This method may be very useful, if the tree to be propagated has no young side shoots strong enough to admit of a bud being taken from them. It is particularly suitable for rare trees, with scaly buds and opposite branches.

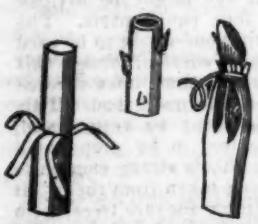
14. *Annular Flute Budding; Greffe en Flute en Anneau,* (*fig.* 11.)—A branch is chosen on the tree which is to be propagated, as thick as, or thicker than, the stock, and a ring of bark, including an eye, is cut from it, and detached by splitting it perpendicularly on one side, and then separating it from the wood by inserting under it the spatula-like handle of the budding-knife. A similar operation is then performed on the stock; that is to say, a ring of bark, exactly of the same size, is detached from the stem in the same manner,

but without caring whether there are buds on it or not. In its place is put the ring taken from the branch to be propagated, with the precaution of making the inner barks join together exactly both at top and bottom. No binding is applied; but the whole is covered with grafting-clay (*onguent de St. Fiacre*) or grafting-wax. Neither the branches nor the head of the stock are to be cut down till the bud has taken. The two periods most favorable for this sort of budding are, the time of the greatest movement of the sap in the spring, and at the end of its greatest movement in August. This mode of budding has the advantage of never mutilating the stock; because, if it does not take, the bark of the ring supplies the place of that taken away. It is not only suitable for the propagation of walnut trees, but also for the increase of all rare trees with hard wood, such as the American oaks and chesnuts.

15. *Split Flute Budding; Greffe en Flute fendue.*—The only difference between this and the preceding mode is, that, if the ring of bark containing the bud is larger than the space prepared for it on the stock, a piece must be taken from it longitudinally, so as to make it fit exactly.

16. *Flute Budding by close Contact, Tube Budding; Greffe en Flute par Juxtaposition, ou en Sifflet.*—The head of the stock being cut off, a ring of bark, 2 in. or 3 in. long, is removed. A shoot is then taken from the tree to be increased, of exactly the same thickness as the stock, and a ring or tube of bark is taken off the thick end, without being split longitudinally, not quite so long as the piece of bark taken off the stock, but provided with two or three good eyes. The tube thus formed is placed upon the stock in the room of the one taken away, and care is taken to make the two edges of bark join below. The part of the stock which projects over the ring of bark is next split into shreds, and brought down over it all round, so as, when secured by grafting-clay, to keep it in its place. This mode of budding is chiefly employed in the south of France for propagating walnuts, chesnuts, figs, mulberries, and other trees with thick bark and abundant pith.

17. *Common Flute Budding; Greffe en Flute ordinaire,* (*fig.* 12.)—The head of the stock is cut off; but, instead of removing a ring of bark, as in the preceding mode, it is cut longitudinally into four or five strips, each 2 in. or 3 inches long, and turned down as in the figure, being left still attached to the tree. From a shoot of the tree to be propagated, a tube of bark is taken, furnished with four or five eyes, rather shorter than the strips, though longer than in tube budding. When the tube of the scion is slipped on the stock, the strips of bark are raised over it, and fastened at the top by a ligature. This method of budding is in very general use both in France and Germany.



18. *Flute Budding in Shreds, with the Stock cut obliquely; Greffe en Flute et en Laniere.*—This is nothing more than the mode above described, with the end of the stock cut obliquely, as shown at *a* in fig. 12, instead of being left to be afterwards cut into shreds and turned down over the tube of bark, as in tube budding, No. 16.

II. HERBACEOUS GRAFTING. *Greffe Herbacee.*

1. *Grafting upon fleshy or tuberculous Roots; Greffe sur Racines charnues ou tuberculeuses,* (*fig.* 13.)—It not unfrequently happens that a tubercle of a georgina root is found without eyes; and, when this is the case, notwithstanding all the care of the cultivator, it may remain in the ground one or two years without budding, till at last it rots. This imperfection is easily discovered if the neck of the tuber is looked at attentively, for it is always there that the buds are found. In this case, as soon as a georgina bud upon some other tuber has begun to germinate, it is picked out with the point of the grafting-knife, and is taken away with a small piece of the tubercle adhering to it. On the neck of the barren tubercle a small hole is made, in which the bud is inserted, but in such a manner as that the base of the bud shall be perfectly on a level with the surface of the tubercle; and it is cemented with grafting-wax. The tubercle is then planted in a pot, taking care not to cover the neck on which the graft is; and the pot is plunged in a hot-bed, under glass. When the graft has taken properly, the plant is turned out into the open border.

2. *Herbaceous Furrow-Grafting for vertical Shoots; Greffe herbacee en Rainure pour les Omnitiges,* (*fig.* 14.)—A bud with a triangular slice of bark and wood, when in a soft or herbaceous state, is cut out of the scion, and inserted in a corresponding groove made in the stock, as shown in the figure; a ligature is applied, and afterwards grafting-wax. This mode of grafting succeeds both with the young wood of trees and with herbaceous plants, whether perennial or annual. M. Tschoudy gave the arbitrary name of *omnitiges* to those plants, all the shoots of which have an equal tendency upwards, and which, of course, are all equally suitable to graft upon.

3. *Herbaceous Grafting for Shoots with opposite Leaves; Greffe herbacee pour les Bourgeons a Feuilles opposees,* (*fig.* 15.)—In the middle of the stem, between two opposite eyes, an angular and longitudinal incision is made, traversing the stem from one side to the other. The graft is cut angularly at its top and bottom, and it is inserted as in the figure. The binding, &c., is then put on as usual. This mode of grafting is suitable for those species of trees, and annual or perennial plants, the buds of which are opposite on the stem, which happens most frequently on the central shoots of plants. M. Tschoudy gives the name of *multitiges* to those plants, the central shoots of which have a tendency to rise more vertically than the lateral ones, and which have consequently more vigor; it is upon these central shoots that the grafts ought to be made.

4. *Grafting on the Stem of Annual or Perennial Plants; Greffe sur Tige de Plantes Annuelles ou Vivaces,* (*fig.* 16.)—The period chosen for this mode of grafting is that of the greatest vigor of the plant, that is, some days before its going into flower. The stem of the stock is cut through above a leaf, as near as possible to its petiole, and a slit downwards is made in the section. A shoot is then taken off near the root of the plant to be increased, the end of which is cut into a wedge shape, and is inserted in the slip made in the stock, taking great care of the leaf on the latter; for it is that which must nourish the scion until it has taken thoroughly, by keeping up the circulation of the sap. A bandage is applied, and the junction covered with grafting-wax, as before. When the graft has taken, which is ascertained by its growth, the ligature is removed, and the old leaf, and the shoots from the stock below the graft, are removed. M. Tschoudy grafted in this manner artichokes upon cardoons, and other plants on their congeners.

5. *Grafting on Succulents; Greffe des Plantes Grasses,* (*fig.* 17.)—Take a young shoot or leaf of a succulent plant, (i. e., of a cactus or opuntia,) and, cutting its base to a point or wedge, insert it in a hole or slit made in the stem or leaf of another species, but of the same genus.

6. *Grafting the Melon; Greffe du Melon,* (*fig.* 18.)—On the stem of a cucumber, or any other plant of the family of Cucurbitaceæ, but having some analogy with the melon, choose a vigorous part of a shoot having a well-developed leaf. In the axil of this leaf an oblique cut is made, of half its thickness. The point of a melon shoot, so far developed as to have its fruit quite formed, is then cut off, and pointed at its end, 2 inches below the fruit. It is inserted in the cleft made in the stock, always taking care to spare the leaf until the scion has taken. The remaining part of the operation is performed in the usual manner, with ligatures and grafting-wax. This mode of grafting succeeds pretty well; but it has not hitherto been applied to any useful end. Tomatoes may be grafted in this manner on potatoes, and it is said that potato plants thus treated produce good crops both of potatoes and tomatoes.

Grafting-wax may be formed with turpentine, bees' wax, resin, and a little tallow, melted together. It may either be put on in the same manner as grafting-clay, but not more than a quarter of an inch in thickness; or it may be very thinly spread upon cotton cloth, and used in shreds like sticking-plaster. In this last state it serves both as a ligature for retaining the escutcheon or scion in its place, and as a covering for excluding the air. In very delicate budding and grafting, fine moss and cotton wool are frequently used as substitutes for grafting-clay or grafting-wax; the moss or cotton being tied firmly on with thread or strands of bast matting.

[From the "Mechanics' Magazine and Register of Inventions and Improvements."]

SEABURY AND YOUNG'S IMPROVED PATENT BARK MILL.

We have received, from Messrs. Seabury and Young a drawing and concise description of their Bark Mill, to which we referred on the cover of the April number. They furnished us with drawings of the different parts, two only of which we have had engraved: one, a cross section, showing the interior of the mill; and the other the apparatus for cracking the bark as it passes in, to the mill.

We have never seen one of them in operation, but are induced to believe that it will be found a first rate machine, not only for the purpose for which it is designed, but also, if made a little finer, for grinding apples, and for breaking corn on the cob for cattle, or preparatory to its being ground into meal.

One of the mills, addressed to Gibert & Son, New-Haven, was some time since left in front of our office, and has attracted much attention, but we are unable to answer the numerous questions put relative to its cost, &c. and would suggest to the patentees the propriety of furnishing the necessary information.

Fig. 1.

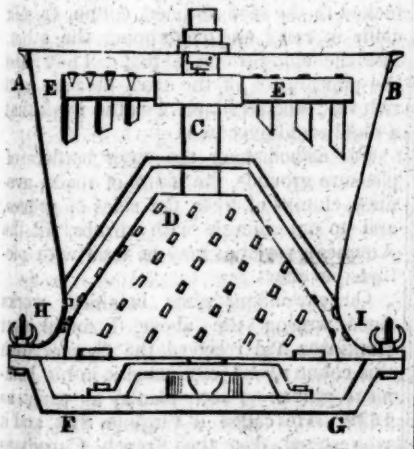


Fig. 2.

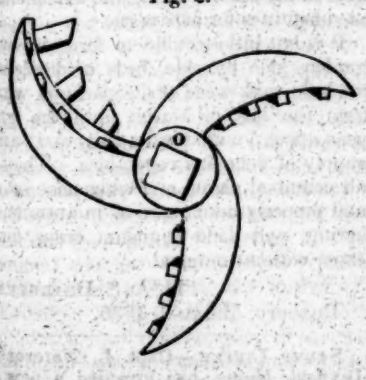


Fig. 1 represents a cross section of the mill when in position for use. A B, the pot; D, the nut or cone, with numerous projections on its surface, which revolves within the pot; C, the upright shaft by which the mill is put in motion; E E, revolving arms or breakers, with teeth projecting both upwards and downwards, which crack the bark as it passes into the mill; F G, the regulating beam, which is operated upon by the screws, H I, and raises or lowers the revolving cone, as the bark requires to be finer or coarser.

Fig. 2 represents the revolving arms as seen in Fig. 1, E E, attached to the upright shaft C, which passes through the mortice O. The object of these arms is to prepare the bark for the mill.

The following, is one of the numerous favorable letters from one who has used the mill; and of Mr. Williams, we can speak as a competent and judicious judge of its merits.—[Ed. M. M.]

Messrs. Seabury & Young:

Gentlemen,—The bark mill I purchased of you I have had in operation about five weeks. I am highly pleased with it, and prefer it in my establishment to any one I have ever used. As an experiment, I have ground half a cord of bark in twenty-eight minutes, (forty-five revolutions,) and ground it well. I can cheerfully recommend it to the public, as a valuable improvement. Should you consider the above of any service to you to present to the public, you are at liberty to publish it. Thomas Williams.

Vernon, Nov. 30.

[From the Horticultural Register.]

On the Culture of Milk-Weed, (Asclepias Syriaca.)—Some four or five years since, in a conversation with George Manners, Esq. the British Consul for Massachusetts, on the various kinds of edible vegetables, cultivated in our gardens, he observed that, during a recent visit to Canada, he was informed that the young shoots of the milk-weed were used as a substitute for asparagus, and asked me if I had ever heard of their being cooked in the United States. I replied, that I perfectly recollected, when a boy, my mother often had them gathered from the fields and road-sides, with the dandelion, shepherds' sprouts, nettles, and other plants, which were collected as greens; but that I had never seen the plant thus used elsewhere, or heard it named as a culinary vegetable; but that I certainly would make an experiment in its cultivation, and as to its qualities, as an addition to our garden pot-herbs.

Having collected the seed in the autumn, it was sown early in the spring in drills, and covered an inch deep. They came up freely in four or five weeks, and when the plants were two years old, I took up a portion of the roots, and set them out about eight inches apart, in a trench six inches deep. The ground had been manured and thoroughly dug over, previously to forming the trench. The following spring, when the shoots were four or five inches high, they were cut, tied up in bunches, boiled and served up with melted butter, like asparagus; and they were as tender, and to my taste quite as delicious a vegetable, resembling in flavor the youngest and most delicate string beans.

As the plant is very hardy, exceedingly prolific, easily cultivated, and such a valuable addition to our early vegetables, I consider a bed of it nearly as desirable as one of asparagus.

No better mode of cultivation can be adopted, than that for asparagus, as described by Mr. Chandler, in his interesting, instructive, and able article, which appeared in the third number of the Horticultural Register,—except the roots of the milk-weed should not be covered more than five or six inches deep.

Mr. Chandler is entitled to the gratitude of his fellow citizens for the valuable result of his experiments; and I freely declare that the mode he adopted and recommends, is the very best which I have ever seen published. I can confirm it, by having followed a similar process, but by no means so perfect in all its parts as that which he has so successfully tested. As a practical, intelligent, zealous, and enterprising tiller of the earth, he has no superior in this State; and the commendable gentlemen who have established a Farm School on Thomson's Island, could not have made a better selection in a superintendent of the art of cultivation in all its branches.

Asclepias (*Swallow-wort,*) is a numerous genus of plants, there being forty-two species, which have been described by botanists, two of which only are found in Europe, but three in South America, while there are eighteen indigenous to the United States, and the others are divided between the West Indies and Africa. Many of the varieties are cultivated as ornamental plants in England and France, but the following kinds, natives of this country, are considered the most beautiful, besides being more hardy than those of more southern climes; still many of the latter are considered worthy of the green-house.

1. *Muschata*, so called by Bartram, for its strong and agreeable musk scent, is peculiar to the natural meadows of South Carolina, Georgia, and Florida. It is a low plant, of not more than five or six inches in height, with flowers of a pale green color, inclining to yellow.

2. *Venosa*, has leaves elegantly variegated with white and crimson veins, and the stems terminate in an umbel of pale flesh-colored flowers.

3. *Pulchra*, — Water-silk-weed, — has nearly erect stems, four or five feet high; umbels very small; flowers crimson purple. Grows on low, wet land, by the side of ponds.

4. *Variegata*, — Variegated. Leaves rough, umbels compact and come out from the side of the stalk; flowers of an herbaceous odor.

5. *Nivea*, — White, or Almond-leaved. Stalks two feet high, and of a dark green. Leaves deep green above, and pale beneath, smooth and rather stiff. Flowers green, with white nectaries.

6. *Incarnata*, — Flesh-colored, — has several upright stalks about two feet high, at the top of which are produced close umbels of purple flowers. Blooms in August.

7. *Decumbens*.—The stalks are declining, hairy, a foot and a half high; leaves narrow; umbels compact, at the extremity of the branches; flowers a bright orange color.

8. *Verticillata.* Stalks slender, upright; umbels at the extremity of the stems; leaves in whorls of four, five, and six together; flowers small and of a greenish white color. Found in Roxbury and Dedham; blooms in July.

9. *Tuberosa*, — Butterfly-weed. Root large, fleshy, branching, and somewhat fusiform, but it is only by comparison with other species that it can be called tuberous; stems numerous, growing in bunches from the root, hairy and dusky red; flowers numerous, erect, and of a beautiful bright orange color; grows in Woburn and Newton; blooms in August.

10. *Obtusifolia*,—Blunt-leaved. Stems erect, supporting a terminal umbel, at a distance from the leaves, which are opposite, ovate, heart shaped at the base; flowers large, of a greenish white, tinged with red; it is found in Cambridge and Mount Auburn; blooms in July.

11. *Phytolocoides*, — Poke-leaved. A tall, large flowering species, of a delicate appearance; stem erect, four or five feet high; leaves large; umbels nodding, flowers large, petals green, nectaries white or flesh colored; grows in low grounds; blooms in June.

12. *Purpurescens*,—Dark-flowered. Stem erect; flowers of a dark crimson purple; grows in Cambridge and Newton, but is rare.

13. *Quadrifolia*, — Four-leaved. A delicate species, growing in dry woods; stems about a foot high; flowers flesh colored; is found in Roxbury and Brookline, and blooms in June.

14. *Viridifolia*, — Green flowered. An inelegant species, with small greenish umbels; is found in Leicester; blooms in July.

For the description of the third and sixth preceding species, I am indebted to Dr. Bigelow's excellent work, on the plants in the environs of Boston. There is a beautiful colored engraving of No. 9, and a more particular account of it, in his other most able and splendid publication, called Medical Botany.

15. *Amoena*,—Oval-leaved. Stalks from a foot and a half to three feet high; at each joint are two large leaves, which are blunt, thickish, stiff, smooth, with purple nerves; umbels rise from the top of the stalk and some of the upper axils; flowers of a bright purple color.

16. *Rubra*, — Red-flowered. Stem upright; umbels many, from the same common peduncle; a native of Virginia.

17. *Parviflora*,—Small-flowered. A native of South Carolina and Florida.

18. *Syriaca*,—Milk-weed, or Silk-weed. This species abounds all over our country, and for the many useful purposes to which it may be applied is deserving of especial attention. The root is perennial, and in April or May throws out, like asparagus and hops, a great number of shoots; the stems rise to six or seven feet in height in a rich soil. When the leaves or stems are broken off, a milky substance, of a viscous consistence, exudes, from whence the plant derives one of its most general trivial names. The flowers appear in July, and are in umbels of from twelve to sixteen on one stem, each containing thirty or forty single flowers, which adhere to the umbel by a long slender stalk, and has a sweetish odor. Each bunch of flowers is succeeded by three, four, and sometimes ten long, flat, and rough pods, which enclose numerous round, flat, thin, yellowish brown seeds, wrapped up in a beautiful shining white and soft kind of silk, which constitutes their wings, and by means of which they are conveyed with ease to a great distance by the wind; it has also given rise to the other trivial name, by which the plant is known in some parts of the country.

The great utility of the Syriaca or milk-weed in the arts has not been understood but since the middle of the last century, although it was introduced into Europe at a much earlier period.

A manufactory of articles from the silk was established in Paris in 1760, and it has long been employed at Lausanne, with advantage, as candle-wicks. Mr. Schneider of Liegnitz, has been distinguished for the zeal he has evinced in relation to the cultivation and preparation of this article, and has recommended it in two different pamphlets.

In the application of it to paper-making, Mr. Schmid, of Lunenburg, made a variety of very interesting and instructive experiments.

The cultivation of the plant has been found very easy. Mr. Schneider began in 1785, with but six plants, and in 1793 he had a plantation of 30,000, which yielded him 800 pounds of silk the first crop, 355 the second, and 600 the third. They were planted in rows about two feet apart, with a sufficient distance between the roots in each row. The silk was separated into two parts, the longer being used for spinning, and the shorter for hat making and beds.

Mr. Schmid, who was an ingenious manufacturer of paper, made several experiments with the capsules, or pods, which gave the following results:

1. From the interior white rind of the pods he obtained writing paper, pretty white, of good quality, and similar to the silk paper of the Chinese.

2. From the external green part of the pods, a greenish colored paper was made, which, when sized, was stronger than paper made from rags. It was almost as close in its texture as parchment, and even when unsized did not suffer the ink to pass through it. It was excellent wrapping paper.

3. From the bark of the stems he obtained a paper so like, in every thing, to paper made from rags, that the difference could scarcely be distinguished.

The silk when taken from the pods, and being freed from the seeds, is hung up in thin bags in the sun, and when perfectly dry, may be used without any further preparation, instead of feathers, horse hair, wool, or cotton, for cushions, bolsters, pillows, mattresses, and coverlets. From eight to nine pounds is sufficient for a bed, bolster, and two pillows. It is lighter and warmer, when used in forming coverlets or comforters, than cotton or wool, and is nearly equal to eider-down.

For spinning, the staple of the silk is too short, when taken alone, and therefore is combined with flax, wool, cotton, or raw silk.

One third of this silk, with two thirds of cotton, forms a very excellent mixture for gloves, stockings, and other articles of like manufacture. One part of this silk, and two of rabbits' fur, forms hats exceedingly light, soft to the touch, glossy, and which have a great resemblance to beaver hats.

The plant throws around it long roots with new eyes; these can be cut off in autumn or early in the spring, before the milk flows, and may be divided into pieces from four to six inches long, which may be planted in trenches, four or five inches deep, in an oblique position, with the eyes or buds standing up.

Where the plant grows wild in abundance, a bed for culinary purposes could be easily formed, from the roots in the manner above described, and would be fit for use the second spring; by which two years would be gained over plants raised from the seed.

Besides the above named articles manufactured from the silk, I recollect having seen, at several of the annual exhibitions of the Massachusetts Agricultural Society, in Brighton, tippets, capes, bonnets, and various other articles, which were very beautiful. They were formed by sewing the tufts of silk by the part which is attached to the seed, to linen, cotton, or silk cloth in rows, one overlapping the other, like the shingles on a roof. They had the appearance of the most delicate and rich fur; and so simple was the work that a child could execute it.

For embellishing the outer borders of pleasure grounds, the skirts of roads, avenues, clumps of trees, the sides of groves, and to intermingle with shrubs, all the American varieties may be used with picturesque effect.

On examining some botanical works since writing the above, I found that Parkinson had received the *Syriaca* from this country, and cultivated it in his botanical garden of rare plants, as early as 1629. He called it Virginia Silk, and it was stated that the French Canadians were in the habit of eating the tender shoots as substitutes for asparagus.

It is but little trouble to form in every garden, side by side, beds of dandelions, sea-kale, milk-weed, and asparagus, which, from the last of March, until the green peas appear, will afford a daily and various supply of delicious vegetables. They are all perennial plants, and when once set out, and properly taken care of in autumn and spring, will yield abundant crops, for all time, without removal.

H. A. S. DEARBORN.

Roxbury, March 9, 1835.

STUMP LIFTER.—Capt. L. Norcross, of Dixfield, Maine, has invented a new machine for lifting out or removing stumps. It consists of a large screw placed in a nut, which is attached to legs like those of a surveyor's compass. These, being sufficiently strong, are placed above the stump, and it is then grappled to the screw by chains or hooks. A large sweep, like that used in some old fashioned cider mills, hav-

ing a nut to fit, is put upon the screw, and horses or oxen hitched on the other end, by means of which the stump is raised from the ground by driving round the sweep.

FORMATION OF CALCAREOUS EARTHS.—Perhaps a few remarks, condensing the best received opinions of geologists upon the formation of calcareous earths, may serve to throw a livelier and more reviving light on the subject of the present discussion, than the dark lantern, with which a very humble advocate for the use of lime is said to be alluring his deluded believers.

The highest mountains of the earth furnish limestone replete with shells and bones. The limestone at the bottom of the deepest mines and cavities is composed of the same materials. Among the highly interesting discoveries of Cuvier, are the osseous remains, in calcareous strata, of not less than fifteen quadrupeds unlike any now in existence; and in a solitary corner of the basin of Paris, Lamarck found about six hundred species of shells, whose existence was most probably "with the years beyond the flood." The water, which in all probability covered large proportions of these formations, was filled with animals adapted to such a state of existence; their shells and bones during a series of ages becoming petrified, produced solid strata, consisting of the exuvia of shell-fish, and the reliquia of animals that perished with the various changes of all-changing time. Other marine animals produced masses by the congeries of their calcareous habitations. "Thus the formation of all calcareous substances seems to be more particularly *an animal process*, as the formation of clay belongs to the vegetable economy; thus the shells of fish are annually reproduced by the mucous membrane, the calculi of the kidneys; the bones themselves consist of calcareous earth; the deposition of callus, when bones have been broken, to again unite them, shows its existence; the various secretions of animals, as saliva and urine, abound with it, as appears by the incrustations about the teeth and the sediment of urine." We never supposed the fertilizing power of the latter liquid doubted, until we read yesterday in the Farmer, that a combination of hydrogen and azote, as evolved in the putrefaction of animal matter, (ammonia,) was poisonous to plants, knowing, as we did, that it existed in the bones, hoofs, horns, and hair of animals, and was the essence or spirit of the urine and the saliva that they secreted; that the value of stable manure was frequently measured or estimated by the quantity of urine with which it was saturated, and that many distinguished agriculturists had recommended reservoirs for preserving it. "The animal mucus," says our now repudiated and rejected authority, the author of the Economy of Vegetation, "is a previous process toward the formation of calcareous earth, and the conclusion *is well established*, that all the calcareous earth in the world has been formed originally by animals. Some appear to have been buried with their shells while alive," not by any sudden inundation, but in succession, and at remote and distant periods.

We are not willing, however, the inference should be drawn, that the limestone, gypseous, or other calcareous formations, are all from aquatic sources; the recrements of *land* animals are abundant in marls, but we consider it rational to conclude, that what would have furnished manure if decomposed in the earth within the reach of atmospheric air, might, in the economy of Perfect Wisdom, have its texture so changed as to furnish manure, after undergoing a subaqueous process of petrefaction and stratification; and that such vast bodies of calcareous substances as now almost encrust the earth were intended for wise and beneficent purposes. Accordingly mankind, from the earliest periods of civilization, have adopted this conclusion, and have appropriated them to the amelioration and improvement of land. We are now told that they have all been occupied with a foolish waste of their energies, by a man who knows nothing with certainty, and whose *reason* and *sense*, if it has any peculiarity about it, is the last that should claim the epithet of *common*,—a man, too, who publicly acknowledges his ignorance of the application of chalk and carbon to the amelioration and improvement of soils, when the fact is indisputable that there is no substance, lime and stable manure excepted, that is so generally, and we might safely add, universally, used in the most highly cultivated countries, as chalk, and in *all* countries where the expense of digging, quarrying, and transporting it are not too extravagant.

By a perusal of the Philosophical Transactions for the years 1778, '79 and '80, we can obtain the experiments of Priestley. This acute observer found that the water from the springs of Buxton and Bath produced more fertility than others, when used for the purposes of irrigation; he immediately proceeded to a rigid analysis of those springs, and found that they contained large quantities of calcareous matter, and that the further they run over and through calcareous strata, the more fertilizing they became; he continued his experiments until he demonstrated that phosphorus was as essential an ingredient in vegetables as in animals—that calcareous earth contained phosphorus—that by its union with it, it became converted into a *hepar*, and was thus rendered soluble in water, without becoming an acid—that during some of the stages of putrefaction, the phosphorus was set at liberty from the calcareous earth, from the alkali, or from the carbon of decomposing vegetables, and acquired oxygen, by which union both light and *heat* are emitted, and vegetation promoted. Sir Humphrey Davy, (whose book and page we were supposed to be guilty of misrepresenting,) has also discovered that calcareous matter, in *some proportion*, is an essential ingredient in *all fertile soils—necessary* to their proper texture; and as a constituent in the organs of plants,* that lime renders matters that were comparatively *inert*, *nutritive*†—that the chemistry of the more simple manures, the manures which act in very small quantities, as gypsum and the alkalies, had been previously exceedingly obscure, but that he had good reasons for believing that they were *actually a part of the true food of plants*, and that lime supplies that kind of matter to the vegetable fibre, which is analogous to the bony structure in animals*—that mild lime, instead of quick lime, should be used with animal manure†—that burnt lime was more beneficial to land containing ligneous or animal fibrous matter, than any other substance of the like nature in its natural state, as marl, chalk, or gypsum‡—that calcareous waters are highly useful upon land, but most so upon land containing the smallest portion of the carbonate of lime‖—that it was important to the agriculturist to be apprised of the difference, (discovered by M. Tennant,) between common and magnesian limestone, the latter of which, *under some circumstances*, is deleterious, if applied in large quantities, but that under common circumstances, the lime from the magnesian quarry was used upon fertile soils "with good effect," and may be applied in larger quantities upon soils containing a large proportion of vegetable matter *with advantage*.§ The probability that Sir Humphrey has assigned to calcareous earths their true office in vegetation, is heightened by the matters afforded by different plants upon analysis.¶ "In the best cultivated countries, lime is now generally used," (we repeat the expression for the sake of the authority.) "Its effects are perspicuous after the lapse of half a century. In some places it is spread on grass land, by which the grass in the first instance, and the cultivated crops afterwards, are found to be greatly benefitted; but in whatever way applied, the soil is hardly ever afterwards exhausted."**

We know, with at least a rational certainty, that plants as well as animals exude matters that would destroy them if retained; but to say that such substances when taken up by the lacteal and absorbent vessels, and before they had become changed, decomposed, compounded, or elaborated in the economy of vegetable growth, were poisonous, is as unphilosophical as it would be to say, that the secretions of animals, derived from the various changes that grass and other vegetables undergo in the organs of animals, were originally poisons. Hence it is that substances that are *essential* to make a soil of the proper texture, when entirely alone, are found to be unproductive. Silex, which constitutes the largest portion of any productive soil, is not an absorbent, and when uncombined is not fertile. The same remark applies to alumine, to lime, or almost any naked substance. Carbonic acid gas, concentrated, or without a portion of respirable air, kills plants as well as animals; and yet we all know that the very first decomposition of the pulp, surrounding the seeds, and which we suppose to furnish it with the best nourishment, is accompanied with the production of this gas in great abundance.

* Elements of Agricultural Chemistry, p. 21.
† El. Agr. Che., p. 216.

* El. Agr. Che., p. 19.
† El. Agr. Che. p. 219.
‡ El. Agr. Che. p. 21.
‖ El. Agr. Che. p. 239.
§ El. Agr. Che., p. 232.
¶ Abercrombie's Practical Gardening, p. 001.
**General Report of the Agriculture of Scotland, &c.

How will it startle some of our theorists, or *dreamers*, if they like the epithet better, to find "that this aerial fluid, the carbonic acid gas, constitutes about four-tenths of limestone, and that this stone having lost its hardness by being deprived of this fluid, regains its former properties," (without the hardness,) "by recovering it."* As the carbonic acid is composed of the acidifying principle, the oxygen and the carbon, (or coal,) plants *may* derive from these principles their acids, their oils, their mucilage, &c. &c. The acidifying principle, attaching itself to different bases, makes wonderful changes in the chemistry of nature; in one case it becomes carbonic acid, in another sulphuric acid, in a third nitrous acid, in a fourth phosphoric acid, in a fifth oxalic acid, &c., &c. We believe it an impossible task, in the present state of the science, to furnish an accurate theory accounting for all these operations, and we are mistaken if it is within the reach of the human understanding; hence the distilled spirits of urine, or of stable manure, may, under some combinations, or without any combinations, be, as is alleged, poisonous to plants, and in other circumstances highly beneficial. With respect to lime, we have no doubt that if men form theories, and search for arguments to defend them, instead of depending upon the *experience* and *practice* of mankind, a controversy may be plausibly maintained until the end of all coming time.

The singular property that plants possess of throwing out a poisonous air in the night, and pure or wholesome air in the day, gave rise to the celebrated controversy between Scheele and Priestley, which may be found detailed at large in the Philosophical Transactions of the period. The contradiction between the results of their experiments struck Dr. Priestley so forcibly that he employed the whole summer of 1778, in the most careful and accurate examination. He soon found that in the course of their decomposition of the atmosphere, they sometimes produced pure air, that they sometimes corrupted good air, that after correcting bad air they again corrupted it, and so on, alternating the process; he was long unable to give a reason for this extraordinary discovery, but having communicated with Bertholet, with Scheele, and other eminent men of that era, he was at last introduced to Doct. Ingenhouz. This philosophical inquirer, in a masterly publication inserted in the 37th volume of the Annals of Agriculture, "has not only thrown considerable light on the economy of vegetation, but also on the renovation and improvement of soils." He demonstrated that a mixture of hydrogen and azote, which *we* denominate *ammonia*, was thrown out by plants in the dark, constituting, when free from other air, the most active poison to destroy animal life that has ever been discovered; he also proved, in contradiction to the doctrine of the two profound philosophers, (Scheele and Priestley,) that all airs which cannot be easily changed or decomposed into fixed air, and all airs possessing no oxygen at all, are true poisons to plants, and among the rest putrid air; but the moment the decomposition of any air commenced, the plant resumed a vigorous and healthful appearance. We shall leave to others the application of these discoveries to the doctrine that ammonia is poisonous to vegetables.

We have already shown from the experiments of Priestley, that we are not entitled to an exclusive fee simple, but only a tenancy in common, in the calcareous soap which we were told had only an ideal existence. We shall close this article with two or three more authorities, to clear ourselves from the disgraceful imputation of imposing on our agricultural friends the coinage of our own brain for a substance existing in nature.

"Mild calcareous earth forwards putrefaction, it is soluble in water, it unites with sulphur, forming *hepar sulphuris*, and with animal and vegetable matters, forming *a soap*."*

"One great use of calcareous earth consists in its uniting with the carbon of the soil, or with that of the vegetable and animal recrements, during some part of the process of putrefaction, thus rendering it soluble in water; forming an *hepar carbonis*, somewhat like a *hepar sulphuris* produced by lime and sulphur, by which process the lime is rendered capable of being absorbed by the lacteal vessels of vegetables to whose roots it readily parts with its carbon"—"the black liquor which flows from dung-hills is partly a fluid of this kind."†

"A second mode by which it is believed to assist vegetation, is by its union with carbonic acid, thus rendering it soluble in water in its fluid state, instead of its being expanded into gas, and thus a great part of carbon, *with which it readily parts to them*, is drank up by vegetable absorbents"—"it unites with vegetable and animal substances, forming *a soap*."‡

We could add a number of authorities, and among them the celebrated author of "The Connection of Agriculture with Chemistry," to confirm this opinion, but they would properly be swept away with the great names so contemptuously scorned by our opponent at the conclusion of his article. We could extract a masterly production from a late number of the North American Review, showing that the conductors of that journal place a different estimate upon the character and attainments of the great and good men who are now dwarfed by a comparison with our opponent in this discussion.

But we seriously ask, can any man, or rather can any woman, desire to multiply authorities for the establishment of the doctrine that lime will combine with vegetable and animal matters and form soap. We shall find our level in housewifery as in agricultural chemistry, if we continue this controversy, and must therefore show our gallantry at the expense of our learning, by submitting the whole matter to the female readers of the Farmer.

HOLKHAM.

* Philosophical Transactions for 1778, '79, '80, where Priestley's Experiments and Ingenhouz's Memoir are found at large.

* Fordyce's Elements of Agriculture and Vegetation—Article, Lime.

† Notes to Phytologia.

‡ Dr. Macbride's Essays, p. 271, et passim.

[From the Genesee Farmer.]

PROPAGATION OF FRUIT.—There is not naturally a propensity in the human mind to take much pains in raising fruit, without some stimulating or exciting agency. The mind must be excited to some object before it will produce any unusual effect. The subject before us, no doubt, has been frequently brought before the readers of the Genesee Farmer, and may have been presented in such a light as to render it useless for me to attempt any addition thereto. But, however, even if this be the case, there may be some who did not give the attention to it which its importance demands; and it may be well to stir up their minds by way of remembrance—not that I possess or profess any superior knowledge on this subject, but by frequently conversing on these things we retain them in our memory, and are prepared to impart such information relative to them as is required.

It is not a little singular indeed, after all that has been said and done, that there is such an astonishing apathy in relation to the cultivation of fruits, the luxuries of which add so much to the comforts and conveniences of life. However, by the aid of an exciting agency, such for instance as the Farmer, we see that people begin to take an interest in this subject, and the means are facilitated for acquiring practical knowledge relative to this and every other subject to which such a journal is devoted.

The propagation of fruit, as practised in different ways, has materially benefitted all those who are engaged in the useful occupation of raising it. Grafting and inoculation are the most successful methods now in operation for propagating fruit. And to these two then I shall confine myself, to make some remarks and observations for the consideration of all who are concerned.

1st. *Grafting.*—This may be successfully practised on apples, pears and plums, and I think to better advantage than by inoculation. The modes of performing this operation are different, but I have generally given preference to what is called cleft grafting. The mode of procedure is as follows: After the stock is chosen, select a smooth place and cut it off—even the top with a knife; this being done, make a slit near two inches deep down the middle of the stock, with a knife prepared for the purpose; then prepare the scion, (taken from a vigorous shoot of the foregoing year, which should be cut in February,) sloping it on each side from a bud or eye, but leaving it thinner on that side which goes into the stock than on the outside, so that it may conform itself to the slit of the stock; then place the scion in the stock so that the inside bark of both may come exactly together. After this is done, the wounds of the stock are covered with an application of wax. The scions should be left with two or three eyes on them, and in case the stock be large, two of them may be inserted in one cleft, one on each side. Let not the scions be loose nor pinched, but a right temperature is necessary for their ready germination.

I have endeavored to render the method so plain, that it shall be the excuse of no one for not adopting it, for every one that

has not good fruit may have it by a little exertion of their own. The only remaining difficulty is making the wax, and this can be done with but very little expense. Take 5 lbs. rosin, 2 lbs. beeswax, and 3 lbs. melted tallow, melt them together, and turn it off into cold water, and work it till hard. This quantity of composition will be sufficient to set a number of thousand grafts. The means have been greatly facilitated for the making and application of this composition, from what they were when the old dirty method of using clay was practised. By a little attention, a person who has never practised it may perform the operation with complete success.

The best time for grafting is when the tree is about an inch through, taken off close to the ground. Although apples do well when put into the top of large trees, pears treated in this manner, my experience satisfies me, will never answer, because they will not unite firmly; hence their aggeneration cannot be effected, and when loaded with fruit they are apt to blow off. Undoubtedly the most suitable tree for the pear is the thorn-apple. The aptitude of their fixidity to this, as far as my observation has extended, is not equalled by any other tree. However, if these cannot be procured, small apple trees will answer, if grafted close to the ground, and the earth raised around them. This may be performed in April or May.

2d. *Inoculation.*—This method of propagation, it seems, is better adapted to peaches, nectarines, plums, &c., than grafting. I will give a description of a method as most successfully practised: "In August, take off a vigorous shoot from the tree to be propagated; then make choice of a stock about three or four years' growth, and in a smooth part of it make a down-right slit in the bark a little above an inch long, and another crosswise at the bottom of that, to give way to the opening of the bark; then with a penknife gently loosen the bark from the wood on both sides, beginning at the bottom; then prepare the bud by cutting it off, entering pretty deep into the wood, as much above as below the bud, to the length of the slit in the stock; after the bud is thus prepared, with the point of the knife and the thumb take out the woody part of it, carefully preserving the eye of the bud; then put the bud in between the bark and the wood of the stock at the cross slit, leading it upward by the stalk where the leaf grew till it exactly closes; then bind it about with coarse woolen yarn, the better to make all parts close regularly, and the bud incorporate with the stock, and the operation is done. The bud will be incorporated in about three weeks' time, when the yarn should be loosened, that it may not gall the bud. All buds should be taken from a vigorously growing shoot, and used immediately."

The choicest and the rarest varieties of fruit may be produced in a very short time by the above methods of treatment, and in fact I have known instances of grafts bearing the same year they were inserted—but they generally begin to bear in about three years. And who but he who has no taste for nature's richest productions would not even try the experiment? I have no doubt but all those who undertake the operation, will perform it with complete success, and ultimately be compensated for all extra expense and trouble.

We have a kind of apple, the value of which in the summer, (for they are not good until then,) is from one dollar to one dollar and fifty cents, and we have kept them a year from the time they were gathered. They are called by the name of Rock Apple. They are pleasant flavored and annual bearers, and I think they might be profitably recommended to all orchardists. I mention this circumstance only to show the propriety and utility of propagation. As the season for grafting has approached, I hope the fruit growers of this country will avail themselves of this opportunity for having their plantations stored with the choicest varieties of fruit. R. S.

[From the Genesee Farmer.]

BURYING BEES.—Mr. Tucker: It is two years this spring since I first commenced bee-keeping. In the out-set I had no knowledge whatever of their management, and it was a stipulation of the bargain with the person of whom I obtained them, that he should, as occasion required, impart to me such facts as his experience would justify, in regard to their culture. This agreement was satisfactorily performed; and, aided by the information thus received, my success, for a tyro's, was such as to create an almost enthusiastic interest in this branch of rural industry.

In the autumn of 1833, I selected four hives, (double the number with which I commenced,) for wintering. Three of these had so limited a supply of honey, that I was advised to bury them, an operation which, in my mind, was little preferable to throwing them away. But I concluded to "try the experiment," and on one of the last days of November, they were "deposited beneath the little mound," where my mind figured them as possessing the interminable repose of "their last resting place." My absence on "the return of spring," that season when dying worms are wooed again to life, and the faded wing of the insect receives new colorings, beautifully wrought, from nature's dye, prevented me the pleasure of witnessing their exhumation, but the person who took them from their temporary sepulchre, (which was done about the 20th of March,) informed me that on their first introduction to the air and light, their animation was as perfect as that usually exhibited by bees in June. He said that he did not find half a gill of dead bees in all the hives. These hives gave swarms earlier and more frequently than the one that remained above ground, during the ensuing summer.

Last fall I concluded to continue "the experiment" with a single hive. The one selected was very light, probably not containing a sufficiency of honey to carry them half through the winter, had they been kept the usual way. In consequence of a rainy season through the last of November, they were not inhumed until December, probably as late as the 10th. They were occasionally fed in the fall, lest their supply should not be sufficient to insure a subterranean existence. My faith was as wavering when these last were buried, as on the previous winter, and as often as I looked at the spot where they were interred, I viewed it as the grave of my little insect friends.

They were taken up on the 28th of March, and much to my satisfaction, I found that the second experiment had terminated with the same happy results as the first. Not two dozen were lost, and *new comb was actually formed while they were in their "dark abode."*

My "modus operandi" is as follows. A hole is dug considerably larger than the hive, or hives, in every respect. On the bottom of the hole two sticks of three or four inches in diameter are placed for each hive, and on these the floor board, which should be a sound one, is placed. Another board, (two inch plank is preferable,) is put on the hive, and dry straw is as compactly as is convenient placed around it. This, in rainy weather, if the ground is clear from frost, allows the rain to pass freely down, while the space between the blocks furnish a ready reservoir, from which it is absorbed by the earth, without offering any injurious effects to the bees. The earth is placed upon the hive in a conical form, to turn the water from the hives, the top of which are about four inches below the surface. With respect to the experiment of 1833–4, I cannot say whether the apertures of the hives were closed, but in that of 1834–5, they were not. This experiment succeeded, but whether it is the best way of proceeding I shall not advise.

I regret that I did not weigh my hives, in both instances, previous to burying and on disinterring them, that the amount of food consumed might have been ascertained. But my experiments were both of them faithlessly tried, and unnecessary ceremonies were dispensed with. The quantity of honey consumed, however, was small, as none but very light hives were selected, and their weight in the spring was apparently nearly as great as in the fall. It is my intention in future experiments to mark items more particularly.

In selecting the spot for burying, a dry, and cold, rather than a warm one, should be chosen. An individual of my acquaintance buried on the south side of a dry hill, and an entire loss of all thus treated was the consequence. I attributed it, (though perhaps some other defect was the cause,) to such situations being more exposed to frequent freezings and thawings, subjecting the insects to more frequent change of temperature, a circumstance injurious to all that comes within its influence. If the situation is such as that the ground will freeze immediately after the trust is committed to it, and remain so until time to "remove the deposits," to me it would appear most favorable. Yours, etc.

WILLIAM BACON.

Richmond, (Ms.) April 23, 1835.

AVERY'S ROTARY ENGINE proves, we are much pleased to be able to state, (as we do on good authority,) to be peculiarly adapted to milling purposes. The following statement, which we take from the Syracuse

Constitutionalist, confirms fully the anticipations of those who have been familiar with its operations for more than two years; and other instances might be cited, if necessary—one especially, at the south, in which it performs to the entire satisfaction of those using it. Its simplicity, however, and entire safety, cause many to doubt its power, until they witness its performances—which, in some instances, may be said to be truly astonishing. As with many, *seeing* only is believing, we hope soon to be able to exhibit a sample of its performances in this office, attached to the press on which this Magazine is printed, that will satisfy all those who may doubt. When it is in operation, due notice will be given.

"An experiment has been made in Mr. N. Felt's saw-mill, in Cicero, with one of Wm. Avery's patent Rotary Engines, manufactured in this village by E . Lynds & on, which has satisfactorily proved (if any further proof was indeed necessary) its superiority over any other now in use. Mr. F. some four years since procured a High Pressure Piston Engine for the purpose of propelling the machinery of his saw-mill, but has never been able to produce any satisfactory results, and therefore discarded it entirely. At the suggestion of the Messrs. Lynds, he was induced to make an experiment with one of the Rotary Engines—one of which was accordingly attached to the same boiler used for the other engine, and put in operation. The experiment proved eminently successful, and those who witnessed its performances are well satisfied of its great utility in propelling machinery of every description, and also of its superiority to the engines in common use.

"The following statement of Mr. Lewis, who is deemed one of the first millwrights and mechanics in the state, sustained as it is by the opinions of a number of others well qualified to judge, will go to show in what estimation the invention of Mr. Avery is held by those who have experience in such matters:

"*To the Public.*—Having been requested by Messrs. Elam Lynds & Son, to examine a Rotary Steam Engine, manufactured at their foundry, (of Wm. Avery's invention,) now in Mr. N. Felt's saw-mill, and in which I am informed they have had a common Piston Engine, with which they were unable to operate their mill successfully,—being much pleased with the operation of the Rotary Engine, although it was laboring under great disadvantages, I embrace this opportunity of saying to the public, that I am satisfied that there is abundant power to operate a mill successfully, and I consider them far preferable to any other Steam Engine now in use for milling purposes. "ISAAC LEWIS.

"Syracuse, April 20, 1835.

"We were present at the above exhibition of the power of the Rotary Steam Engine, and fully concur with Mr. Lewis in his statement, from what we saw of the operation of the Engine, and from our confidence in him as a millwright and a practical mechanic.

ROSWELL HINMAN,	ASHBEL KELLOGG,
THOMAS SPENCER,	J. G. FORBES,
M. D. BURNETT,	P. D. MICKLES,
M. S. MARSH,	V. W. SMITH,
DANIEL ELLIOTT,	J. M. PATTERSON,
L. H. REDFIELD,	E. K. SMITH."

The following inquiries have since been addressed to Mr. Felt, to which the answer annexed has been furnished. We recommend the correspondence to the attention of machinists.

We extract the inquiries from a letter to Mr. F. from E. Lynds & Son.

"1st. Have you made any alterations in your boiler, in any form or manner, since putting the rotary in use, so as to afford more steam with less fuel?

"2d. Is there any difference in the amount of fuel required to perform an equal amount of labor with either of the engines? If so, which requires the least, and what is the difference in the quantity used?

"3d. Does the rotary engine do more or less work, in the same time, than the piston engine? What is the amount of difference?

"4th. Which engine do you conceive to be the most simple in its construction, and in its application to any mechanical purpose the most natural? Also, which is kept in repair with the least expense?

"5th. If you were to put another mill into operation, which engine would you prefer; and which do you think the most valuable for any mechanical purposes?"

From Mr. Felt, to Messrs. Lynds.

"Clay, May 1, 1835.

"GENTLEMEN,—It is with pleasure I comply with your request in giving my opinion (founded upon practice and short experience,) in relation to the difference between the former High Pressure and Avery's Patent Rotary Engine, which I now have in operation in my saw-mill.

"In answer to your first question, I would say I have made no alteration in my boilers or arches.

"2d. As to the amount of fuel required, I am not able to answer precisely, but am sure the rotary does not require more than two-thirds the quantity to put it in operation the piston engine required.

"As to the amount of business performed, the rotary will do double the amount of the piston engine in the same time. So far as I am acquainted with the two engines, I consider the rotary the most simple in its construction and application to mechanical purposes, and I think is kept in order with the least expense. With the experience I have with the two engines, I should prefer the rotary for any mechanical purposes whatever. "Respectfully yours,

"NORRIS FELT.

"Elam Lynds & Son."

SUSPENSION BRIDGES.—At a meeting of the Clinton Suspension Bridge Committee last week, Mr. West's report on the principle of wire suspension bridges was read and approved. This gentleman has recently been examining the suspension bridges of France and Switzerland, most of which are of wire. He stated that previously to the opening of the Fribourg bridge, in October last, proof was made of its capability of sustaining great weight, by placing 36 horses, 14 pieces of artillery, and 300 people upon it at one time, which did not cause the slightest derangement in the structure. Upon the occasion of opening the bridge, a grand procession of the clergy and municipal authorities took place, when no less than 1,800 persons, estimated at 90 tons, were at once on the bridge. The two largest bridges over the Soane, at Lyons, are of wire, and are crossed by the heavy French diligences, weighing 5,000 lbs. each, and allowed by law to carry 6,000 more.—[English paper.]

[From Transactions of the Essex Agricultural Society.]

ON COLORING.

The art of fixing on cloths beautiful colors, although not one of the most necessary, has been made by the fashions, taste, and pride of men, in all ages and nations, one of the most valued of inventions. It is altogether a chemical art. Its theory is now well understood, and is in a high degree interesting to every studious mind, useful to all engaged in manufacturing, or in buying, selling, or consuming colored fabrics. It is, therefore, worthy the attention of all our readers.

Colors, to be permanent, must be combined with the fibres of the silk, wool, cotton, or linen, of which the cloth is composed. To understand how this can be effected, we must acquaint ourselves with the laws of chemical affinity. Affinity is nothing more than the disposition or tendency which two or more substances have to unite and form a new compound, differing greatly in some of its qualities from the simple substances of which it is composed; one substance is therefore said to have an affinity for another when, on being brought in contact, it unites with and assumes new appearances and qualities. For example, if iron and sulphuric acid (oil of vitriol) be brought together, they gradually unite and form sulphate of iron (green vitriol or copperas), but the sulphuric acid has a stronger affinity for lime than it has for iron; if, therefore, lime be brought into contact with sulphate of iron, the sulphuric acid quits the iron, seizes on the lime, and forms sulphate of lime (plaster of Paris.) Substances used in dyeing possess an affinity for the fibres of the cloth, and when dissolved in water or some other liquid, and brought into contact, they unite, and change either the color of the fibres, or so change their qualities, as to dispose them to unite with other coloring matter for which before they had no affinity.

The art of dyeing, then, consists in combining a certain coloring matter with the fibres of the cloth. This process cannot be well performed unless the dye-stuff be dissolved in some liquid, and the particles so separated that their attraction for each other becomes weaker than the attraction for them exerted by the cloth. When the cloth is dipped into this solution, it attracts the coloring matter, and from its stronger affinity takes it from the solvent and fixes it upon itself. The facility with which cloth imbibes a dye, depends on two circumstances, namely, the affinity between the cloth and the dye-stuff, and the affinity between the dye-stuff and its solvent. It is of importance to preserve a due proportion between these two affinities, as upon that proportion much of the accuracy of dyeing depends. If the affinity between the coloring matter and the cloth be too great, compared with the affinity between the coloring matter and the solvent, the cloth will take the dye too rapidly, and it will be scarcely possible to prevent its color from being unequal. On the other hand, if the affinity between the coloring matter and the solvent be too great, compared with that between the coloring matter and the cloth, it will either not take the color at all, or take it very faintly. Wool has the strongest affinity for most coloring matter, silk the next strongest, cotton a much weaker affinity, and linen the weakest of all. In order, therefore, to dye cotton or linen, the dye-stuff should, in many cases, be dissolved in a liquid for which it has a weaker affinity than for the solvent employed in dyeing wool or silk. Thus we may use iron dissolved in sulphuric acid to dye wool, but for

cotton and linen it is better dissolved in vinegar. Was it possible to obtain a sufficient variety of coloring matters having a strong affinity for cloth, the art of dyeing would be exceedingly simple and easy. But this is by no means the case; if we except indigo, the dyer is scarcely possessed of a dye-stuff which yields of itself a good color, sufficiently permanent to deserve the name of a dye. To obviate this difficulty, some substance must be employed which has a strong affinity both for the cloth and the coloring matter. Substances employed for this purpose are called mordants. Those chiefly used are earth, or metals, in the form of salts or in solution, tan, and oil. One of the most frequently used is *alum*. This salt is composed of pure clay (alumina) dissolved in sulphuric acid. Into a solution of alum the cloth is dipped, the fibre of the cloth having a stronger affinity for the clay than the sulphuric acid has, unites permanently with it. It is then taken out, washed and dried, and will be found a good deal heavier than before, although the color remains the same, the clay, which now forms a part of it, being perfectly white. The cloth may now be dyeed by dipping it in a solution of any coloring matter for which the clay has a strong affinity. The clay and coloring matter may be united previous to the immersion of the cloth, and the fibres will still unite themselves with the compound, but not so equally and permanently as when dipped into each of the solutions separately. But the sulphuric acid has rather too strong an affinity for the clay to yield it readily even to wool. Most dyers, therefore, add to the solution of alum a quantity of tartar. Tartar is composed of potash and an acid found in grapes and some other vegetables, called tartaric acid. When solutions of alum and tartar are mixed, the sulphuric acid quits the clay and seizes on the potash, dislodging at the same time the tartaric acid, which seizes in turn on the clay just abandoned by the sulphuric acid. The tartaric acid, having a weaker affinity for the clay than the sulphuric acid possesses, yields it more readily to the cloth. Another purpose is also gained: the sulphuric acid remains combined with the potash, and this corrosive substance is thereby prevented fro[m] injuring the texture of the cloth. For co[t]on and linen, which have a weaker affinity to clay than wool or silk, another process becomes necessary. Lead or lime dissolved in acetic acid (vinegar) is poured into the solution of alum. A solution of sugar of lead is frequently used. The sulphuric acid quits the clay and seizes on the lead or lime, both of which, united with this acid, form insoluble powders, which fall to the bottom, and the acetic acid unites with the clay, for which it possesses only a weak affinity, and readily yields it to the cotton or linen immersed in it.

Metallic salts may also be used as mordants. Those of iron and tin are extensively used in dyeing. Iron is used as a mordant in two states, in that of sulphate of iron, (copperas,) or acetate of iron, that is, iron dissolved in vinegar or in the acid obtained by distilling wood (pyrolygneous acid.)

Tin is used as a mordant in three states—dissolved in nitro-muriatic acid, (a mixture of the acids obtained from saltpetre and from common salt,) in acetous acid, and in a mixture of sulphuric and muriatic acids. The nitro-muriate of tin is the common mordant employed by dyers. It is prepared in the following manner: Melt block tin and pour it into water briskly agitated with a bundle of small rods, take of this granulated tin 2 oz., nitric acid 1 lb., water ½ lb., common salt or sal ammoniac 2 oz., mix them together in a glass vessel, and the tin will be slowly dissolved.* When nitro-muriate of tin is to be used as a mordant, it is dissolved in a large quantity of water, and the cloth is dipped in the solution until sufficiently saturated. It is then taken out, washed, and dried. Tartar is usually dissolved in the water along with the nitro muriate of tin. This changes the compound into a solution of the tartrate of tin and nitro-muriate of potash. The tartrate of tin is again decomposed by the cloth. The metal quits the acid and attaches itself to the fibres of the cloth, and in this state possesses a strong affinity for coloring matters, and forms with them the most permanent and brilliant dyes.

Tan is also employed, along with other mordants. It is found in nutgalls, oak and hemlock barks, sumach, and in a great variety of other vegetables. It is that part of barks, &c. which has a strong affinity for glue, of which hides are chiefly composed, unites with it and forms leather. It has a strong affinity also for cloth and for several coloring matters. Silk is capable of absorbing a very great proportion of tan, and thereby acquires a great increase of weight. For this purpose alone it is sometimes employed by silk manufactures. Tan is often employed, also, along with other mordants, in order to produce a compound mordant. Oil is also used for the same purpose, in dyeing cotton and linen.

Besides these mordants there are several other substances frequently used as auxiliaries, either to facilitate the combination of the mordant with the cloth, or to alter the shade of color; the chief of these are tartar, sugar of lead, common salt, sal ammoniac, sulphate of copper, (blue vitriol,) acetate of copper, &c.

Mordants not only render the dye permanent, but have also considerable influence on the color produced. The same coloring matter produces very different dyes, according as the mordant is changed. Cochineal, with salts of iron, produces black,—with the salts of tin, scarlet,—and with alum, crimson. In dyeing, then, it is not only necessary to procure a mordant which has a sufficiently strong affinity for the coloring matter and the cloth, and a coloring matter which possesses the wished-for color in perfection, but we must procure a mordant and a coloring matter which, when combined together, shall produce the wished for color in perfection.

The colors denominated by dyers simple, because they are the foundation of all their other processes, are four, viz. blue, yellow, red, and black. A few simple directions for dyeing wool, silk and cotton of these colors will now be given. We write for prudent and economical housewives, silk culturists, and agricultural manufacturers, and the means within the reach of such must therefore be kept continually in view, in all the operations recommended.

Blue.—Indigo is the only substance that can be economically used in families for coloring blue. The best or purest indigo is light, easily powdered, tasteless, almost destitute of smell, and breaks smoothly, that is, with smooth surfaces. Some will float on water, and this is generally the purest. The color of indigo also varies. There is the blue, the violet, and copper colored. Although these may all contain nearly the same quantity of coloring matter, yet they are differently valued, the blue selling 20 per cent. higher than the violet, and from 40 to 80 per cent. more than the copper colored. The blue is preferred by dyers for combination, or solution in sulphuric acid, and the copper colored for the indigo vat, in which it is dissolved in a potash ley, aided by bran, madder, or other vegetable products, in a state of fermentation. Before indigo can be applied and fixed upon the fibre of cloth, it must be dissolved in water. But it cannot be dissolved in water in its blue state; it must be converted to a green or yellow color, and then it readily dissolves, is attracted by the fibres of the cloth, becomes permanently combined with them, and on being exposed to the air becomes again blue. In the solution of the indigo, therefore, consists the whole art of coloring blue. The following are among the most easy and simple methods of dissolving indigo, or, in other words, forming a blue dye.

First Method.—Take indigo, well powdered, one ounce; quick lime, one ounce; potash, two ounces; copperas, two ounces; molasses, half a pint; warm water, one gallon. Mix, and stir occasionally, keeping the vessel, of copper, iron, or earthen, well covered and in a warm place. The liquor will soon become green, covered with a copper colored or blue scum. In twenty-four hours it will be fit for use. Immerse the stuff to be colored for a longer or shorter time, according to the shade required. The strength of the color may also be varied by using a greater or less quantity of water. A very little practice will enable any one to give wool, silk, or cotton, properly prepared, with this dye, a beautiful and permanent blue, of any shade they may choose.

Second Method — *Saxon Blue.*—In this method, the indigo is dissolved by the aid of sulphuric acid, without losing its blue color, but it undergoes a change which renders it less permanent, and is therefore not much used, except for articles not very durable, or when a deep, unfading tint is not considered of much importance. This preparation is kept in the shops, under the name of *Liquid Blue*, or *Chemical Blue*, and is much used for blueing white cotton and linen garments, from which it is readily washed out, even in cold water. It is also extensively used in coloring greens, giving, with yellow, a more brilliant color than the blue obtained by the first method. On wool and silk it is much more durable than on cotton, and on articles which do not require frequent washing, may be often used advantageously as a blue dye. It is prepared as follows:

Take indigo, well powdered, one ounce; sulphuric acid, four ounces — mix it in a glass or stone ware vessel, and let it stand twenty-four hours, stirring it occasionally—then add one ounce of dried potash. Let it stand twenty-four hours longer, add half a pint of water, and bottle it up for use.

Mix a wine glass full of this liquid in a pail full of boiling water, and dip the stuffs till they acquire the color desired. More of the liquid must be added when the water becomes nearly clear, before the stuffs have acquired a color sufficiently deep.

Yellow.—There are a great number of imported and native plants, roots and barks, that, by the aid of the mordants alum and

* When common salt, which is composed of muriatic acid and soda, or sal ammoniac, composed of the same acid and ammonia, is mixed with diluted nitric acid, a part of the nitric acid seizes on the soda or ammonia, and sets at liberty a part of the muriatic acid, which mixing with the remaining nitric acid, forms nitro-muriatic acid, (aqua regia,) which readily dissolves tin, gold, &c. It is more economical, however, to add sulphuric acid enough to saturate the base of the salt, which sets all the muriatic acid at liberty, and leaves the nitric acid undiminished.

tin, dye yellow. But the very best of all these, viz. the yellow oak bark, or quercitron bark, as it has been named in England, being very plenty in this country, it seems altogether unnecessary even to mention any other.

To dye 10 lbs. weight of cloth, or woollen stuffs, of the highest and most beautiful orange yellow, 1 lb. of quercitron bark, and the same weight of murio-sulphate of tin, will be required*; the bark, powdered and tied up in a bag of thin cotton or linen cloth, may be first put into the dyeing vessel, which of course must be brass, copper, glass or earthen, with hot water, for the space of six or eight minutes; then the murio-sulphate of tin may be added, and the mixture well stirred two or three minutes. The cloth, previously wet thoroughly with warm water, may be put in and turned briskly a few minutes; the color applies itself in this way so equally to the cloth, and so quickly, that after the liquor begins to boil, the highest yellow may be produced in less than fifteen minutes, without any danger of its proving uneven.†

When a bright golden yellow, approaching less to the orange, is wanted, four ounces of the murio-sulphate of tin, and two ounces of alum, and one pound of bark, managed in the same manner as above directed. Pure bright yellows, of less body, may be colored by employing smaller portions of the articles above mentioned.

A good yellow may also be produced by boiling the cloth for one hour in one seventh of its weight of alum dissolved in a suitable quantity of water, and then, without being rinsed, put it into a dyeing vessel with clean hot water, and about as much quercitron bark, tied up in a bag, as was used of alum. Boil and turn it as usual, until it takes sufficient color, then dip it in warm lime water for ten minutes, and rinse it well immediately afterwards. Tin, however dissolved, when used in coloring wool or silk, renders the fibres a little harsh; but this may be in a great measure obviated by employing the murio-sulphate of tin with a mixture of alum, or alum and tartar, and combining these with the coloring particles of the bark before they are applied to the stuffs.

In dyeing silks, more alum and less tin should be used than is directed for woollens, because tin, unless used sparingly, always diminishes the glossiness of the silk.

To produce a lively yellow on silks, it will be sufficient to boil after the rate of four ounces of bark, three ounces of alum, and two ounces of the murio-sulphate of tin, with a suitable quantity of water, for ten or fifteen minutes, and the heat of the liquor being reduced so that the hand can bear it, the silk is to be put in and dyed, as usual, taking care to agitate the liquor continually, that the coloring matter may not subside until it has acquired the proper shade. By adding very small proportions of *cochineal* to the bark, the color may be raised to a beautiful orange, or even aurora. A similar effect, though less brilliant and beautiful, is produced by adding madder to the quercitron.

A Yellow on Cotton and Linen. — It has been said that the fibres of cotton and linen have not so strong an affinity for clay and tin as those of wool and silk. A somewhat different management, therefore, becomes necessary in coloring the former goods, from that which is required for the latter. The fibres of linen or cotton are prepared for dyeing by being first boiled in water, with a portion of potash, and afterwards bleached. It should then be soaked in water soured with sulphuric acid, to dissolve and remove all earthy matter, and then be thoroughly rinsed, to free it from the acid. Alum, and not tin, must be used as the mordant, for although tin gives yellows exceeding all others in lustre and beauty, on cotton, they decay very speedily when exposed to the sun and air.

For 1 lb. of cotton and linen yarn, or cloth, take alum 3 ounces, sugar of lead 1 ounce—dissolve them in one gallon of water, about blood warm, and soak the stuff two hours; take it out, moderately squeeze or wring it, let it then be dried, and then soaked again in the solution of alum, squeezed and dried as before; then let it be thoroughly washed in lime water and dried as before. Let it then be well rinsed and put into a kettle of cold water with three ounces of quercitron bark tied up in a bag; stirring it frequently, gradually raise the water to a boiling heat; let it boil a few minutes only, as longer boiling would injure the color, and take it out, rinse and dry as usual. It has been found that by immersing cotton a great number of times, alternately in the solution of alum and lime water, and drying after each immersion, the color acquires greater body and durability. The reason of this seems to be found in the shrinking of the aluminous basis (the clay) in drying, and thereby making room for an additional quantity to penetrate the fibre after each drying; and the larger the quantity of this substance united or incorporated with the cotton, the deeper and more durable will be the color fixed upon it.

There are other methods of preparing cotton, so that it will take a sufficient quantity of the clay, from alum, without the use of the sugar of lead, and which are, consequently, somewhat cheaper than the one described above.

Take of the roots of our common sumach, (rhus glabrum,) dried and chipped, one pound, sal soda four ounces, or barilla half a pound, which is an impure soda used by manufacturers of hard soap, and in two or three gallons of soft water boil them for one hour, and then strain off the liquor and steep the cotton therein for two or three hours. Take it out of this liquor, and steep it for the same length of time in a mixture of warm water and fresh cow dung; rinse it out and dry it. Dissolve three ounces of alum in one gallon of water, soak the cotton in this and lime water alternately, and dye it slowly with the quercitron bark as before directed. By the addition of madder, the yellow may be raised to orange, &c.

Woollen, silk, or cotton goods, colored yellow as directed, may be immersed in the saxon blue dye, (second method,) and made to take any shade of green which may be desired.

Red. Crimson, on Wool or Silk.—Provide yourself with the following articles: alum ½ lb., cream of tartar ¼ lb., Nicaragua wood 1½ lbs. Dissolve the alum and tartar in four pails of water, in a brass or copper kettle; when boiling, put in the cloth, yarn &c., and continue the boiling two hours, then take it out and cool and wash it. Fill the kettle again with water, put in the Nicaragua wood tied up in a bag, put in the cloth and boil one hour, take it out and wash it, and if you wish to change the color to crimson, add one ounce or more of pearlash to the liquor, and boil again for fifteen minutes.

Madder Red.—Soak the cloth, &c. as directed in the last receipt, then, instead of the Nicaragua wood, put into four pails full of water, 1½ lbs. of madder and ¼ lb. of the nitro-muriate of tin, and when blood warm put in the cloth and turn it continually till it boils, take it out immediately and dip it into lime water, and turn it for a few minutes without boiling, take it out and wash it, &c. The quantity of dye-stuffs mentioned in these receipts are calculated for about 2½ lbs of woollen goods.

Scarlet. — Firstly, color as directed for the most brilliant yellow, then take one ounce of powdered cochineal for every pound of cloth, and put it into the yellow dye from which the cloth has been just taken, or into a suitable quantity of clean water, with one ounce of murio-sulphate of tin. Put in the cloth, and boil it for fifteen or twenty minutes, wash and dry as usual.

To color cotton red, with Brazil or redwood, Nicaragua wood or madder, it must be soaked in alum water, and otherwise managed as directed for yellow, the red wood, &c. being used instead of the quercitron bark.

Black.—To dye woollen goods black, perfectly and most durably black, they must first receive an indigo blue, as described in our first method, and be well scoured out afterwards. The mordant used in dying black is iron—sulphate of iron (copperas) is most generally used for wool. There are a great number of dye-stuffs, both native and imported, used in coloring black. Nutgalls are usually considered the best for this purpose, but Bancroft says, and we think correctly, that the bark of the red flowering maple (acer rubrum), so common in swamps in this county, gives "a more intense, pure, and perfect black, than even galls, or any other vegetable matter within our knowledge." Logwood is a useful addition, especially where the cloth has not received an indigo blue. It certainly improves the appearance of the black dye from galls and iron, by rendering it more intense, glossy, and soft. In fact, it seems that almost every coloring vegetable matter for which the fibres of wool have an affinity, adds something to the body of black, and lessens the hardness or harshness which iron gives to wool. Among other articles, therefore, which may be advantageously used in black dyes, are the barks of our common elm and alder, and several species of lichen, or mosses, which grow on rocks, and have long been in use among us for dyeing various cheap colors.

For best Black, on cloth previously colored blue with indigo, take dried maple bark 12 ounces, or 1 lb. of the fresh undried bark, logwood 6 ounces, elm bark 8 ounces, and boil them in two gallons of water for one hour. Take out the bark, immerse the cloth, and boil another hour. Then take 5 ounces of copperas, dissolve in 2 qts. of water, and add it slowly to the liquor in the boiler. The cloth should be kept continually turning in the boiling liquor for two hours. Take it out, cool it, and again soak it in boiling water, to which a small quantity of ox gall or fresh cow dung has been

* Murio-sulphate of tin. This preparation differs somewhat from the muriate of tin, or nitro-muriate of tin, the method of preparing which is given in a preceding part of this essay. It is prepared as follows: Take six ounces of muriatic acid, and pour it upon about the same weight of tin, granulated as above directed, in a glass vessel. Then pour slowly upon the same four ounces of sulphuric acid, and let it stand in a warm place till the acids saturate themselves with tin, that is, till they will dissolve no more, which will be soon effected, if heat be applied, and gradually without being heated.

† Should a deeper orange tint be desirable, add to the quercitron bark a little madder, perhaps an ounce or less to the pound of bark, according to the color desired. This will greatly increase the beauty of the color, when examined by candle-light

added, another hour. Rinse it out, and scour it well with hot water and hard soap.

Cloths not colored with indigo will take a good black if the quantity of logwood be increased, and the dippings alternately in the decoction of the bark, &c. be many times repeated.

Black on Silk.—The fibres of silk do not so readily receive the black dye as those of wool. What the woollen dyer effects by three or four dippings, the silk dyer scarcely obtains from twenty. As the affinity of the silk for the soluble part of the galls or maple bark is greater than with the iron, it is thought most advantageous to begin by boiling about one half as much in weight of the galls or bark as of the silk to be dyed, in a suitable quantity of water, for three or four hours. Let it settle, pour off the clear liquor, and macerate the silk in the same for twenty-four hours. Being dried and slightly rinsed, the silk is afterwards immersed in a solution of the sulphate of iron (copperas), moderately warmed, and kept therein twelve hours, after which it should be rinsed and immersed in a warm decoction of logwood for several hours, again immersed in the solution of iron, rinsed, again transferred to the decoction of bark, &c.; repeating these alternate immersions till the desired color shall have been produced. Iron, dissolved in vinegar, is still better than copperas. A black vat may be easily prepared for coloring silk, by immersing in vinegar old iron hoops, turnings of iron, or iron in small and thin pieces, to which may be added maple bark, the berries and bark of the sumach, oak bark, alder bark, &c. and left to undergo a gradual solution by the joint action of the acids and acerb vegetable matters. The longer the liquors are kept, the better. In some coloring establishments in Europe such vats have been kept for ages, being replenished from time to time by additions of the several ingredients above mentioned. By repeated dippings in black dyes, silk may be made to acquire nearly a fourth part more in weight than it possessed before its natural gum had been separated from it by the boiling with soap, a process to which all new silk should be subjected before it is colored. But the color produced by this excess of black is not so good as it is when no such excess has been employed. As soon, therefore, as the silk becomes sufficiently colored, judging by the eye, it should be rinsed out and passed through a bath containing at the rate of one pound of starch and half a pound of linseed oil, well mixed with six quarts of warm water.

Black, on Cotton.—Cotton may be colored black in the dyes above mentioned for wool and silk. A somewhat different management is however recommended by the best writers on the subject. One, who is considered good authority, recommends making a decoction by boiling the logwood, maple bark, &c. above directed, and pour the clear liquor into a tub. Fill another tub with a like quantity of lime water, and another with the copperas water, formed by dissolving two and a half ounces of copperas to each gallon of water, and while the decoction and lime water are nearly boiling hot, dip and turn the cloth for thirty minutes, take it out, wring and air it; then put it into the copperas water and turn it as usual fifteen minutes; wring and air it again, then dip it in the lime water five minutes, and let it be well washed. If the color does not become sufficiently dense, repeat the operations until the desired effect be obtained. Then dip it in the mixture of starch, oil and water, as directed for silk. Much benefit may also be expected from soaking it a short time, previous to its being oiled, in a mixture of ox gall and water. When the cloth has not been first dyed blue with indigo, more dippings and a stronger decoction of logwood will be necessary. In some great dyeing establishments the black vat, as directed above, is chiefly used for coloring cotton black, instead of the copperas water, and is doubtless preferable, when it can be readily obtained. The cloth should be first steeped in a decoction of nutgalls, or the barks above directed, and afterwards macerated and worked several times in the liquor of the black vat, drying it between each of the macerations, and finally, being well rinsed, it is to be dyed with a quantity of maple bark, galls, &c., to saturate the iron imbibed in the black vat. To soften the black so produced, the yarn, &c. is usually passed through a bath of starch and oil, well mixed and stirred, employing for this purpose at the rate of one ounce of oil for each pound of cloth, yarn, &c. This employment of linseed oil gives a soft, glossy appearance to the black dyed upon cotton and linen, renders the color more intense and durable, and is particularly important for sewing thread. But care must be taken not to withdraw the cotton from this mixture till by suitable management the oil has been equally applied to all parts of it.

Having given what we believe some of the best methods of dyeing the four simple colors, and incidentally mentioned some of their compounds, we now proceed to give directions for coloring several of those which are most frequently used, or which have been, or still are, most highly esteemed by mankind. Among these are the purple, once the most costly and valued of colors, worn only by princes and the most wealthy of mankind. The ancient color was produced by a liquor found in small quantities in one or more species of shell fishes. It is yielded by a species of the Buccinum, which resembles in form the garden snail. This liquor is found in a little white or yellowish bag, placed transversely in immediate contact with the shell, near the head of its inhabitant. It is nearly colorless, but when applied to linen, cotton, &c., and exposed to the rays of the sun, it will become green, blue, and finally a most durable purple. Perhaps this animal may be found on our coast, and be advantageously used for marking fancy work, &c. Josselyn, in his 'New-England Rarities Discovered,' says—"At Paschataway, a plantation about fifty leagues eastward of Boston, in a small cove, called Baker's Cove, they found this kind of muscle, which hath a purple vein, which being picked with a needle yieldeth a perfect purple or scarlet juice, dying linen so that no washing will wear it out. We mark our handkerchiefs and shirts with it." But purple, being a compound of red and blue, is more cheaply dyed by the following method. The cloth must be first colored blue, by either of the methods recommended in this essay. The saxon blue (second method) gives the brightest, but least durable color. It must then be boiled with alum and tartar, as directed for yellow, and afterwards dyed with cochineal, employing from half to two thirds of the quantity required for scarlet. Or, instead of using the alum and tartar, the murio-sulphate of tin, as directed for yellow and scarlet, may be used as a mordant, and a more brilliant purple thereby obtained. Silk, previously dyed blue, by the first method, being macerated in the murio-sulphate of tin, sufficiently diluted, may be made to receive a fine and lasting purple, or violet, according to the shade of blue previously communicated, by dyeing it with cochineal. Some varieties of purple and violet may be produced by substituting madder for cochineal, but, though lasting, they will be less beautiful. Brazil wood, Nicaragua wood, and in fact whatever will color red, will give, with indigo blue, purples, often lively and beautiful, but they have but little stability.

On Cotton.—Cotton, macerated in a decoction of galls or maple bark, employing about one pound of galls to six of cotton, then dried and afterwards soaked in a saturated solution of equal parts of alum and copperas, being again dried, rinsed, and dyed with its weight of madder, will obtain a fast color, which, by varying the proportion of alum and copperas, using more alum the lighter you want the shade, may be made to incline more or less to purple or violet.

Green.—Green is a compound of blue and yellow, and we have incidentally mentioned the method of producing it, while treating of those colors. With indigo and quercitron bark, every shade of green may be given to suit the fancy, following the directions already given. When greens are produced on blues dyed by our first method, the blue part of the color will be most permanent. But the reverse happens when the saxon blue is used. In dyeing silk green, it is thought best to apply the yellow first. Employing a little logwood and sulphate of iron (copperas) with the yellow and blue coloring matters, will change it to a bottle green.

On Cotton.—Cotton must be alumed, &c., as directed in coloring yellow. This may be done after it has received the blue by method first. Macerating in a strong decoction of sumach, should not be omitted in the process. There are many other compound colors, which may be more cheaply produced by a direct application of coloring matters by a single process. Of such we shall now briefly treat.

Cinnamon Color, &c.—A very lasting cinnamon color may be dyed on wool, silk, or cotton, with maple bark and alum.

Hemlock bark, with alum, produces on wool a lasting bright reddish brown, and on cotton a nankin color, which is less durable. With copperas, this bark produces drab and slate colors.

Butternut bark dyes on wool, without any addition, a durable tobacco brown. With alum it will be rendered brighter, and may be fixed on cotton. With copperas, or iron dissolved in vinegar, it communicates to wool, linen, and cotton, a strong and lasting black; with alum and copperas, various shades of brown and drab. The bark of several species of walnut gives, with alum, chesnut brown; with copperas, drabs, &c.

Galls. These are excrescences produced upon several species of oak by the gall-fly. Those in common use are imported, but our farmers would do well to try those found on their own oaks, peradventure they may therein discover another source of income, for unless their use should be superseded by maple bark, galls will always find a market. We have already spoken of their use in dyeing black. It only remains to notice the light cinnamon fawn color, which galls (like many other vegetables that produce black with iron) afford, particularly on cotton, with alum. Galls communicate a durable nankin color to cotton, after the latter has been macerated in milk, dried, soaked in alum, with one eighth its weight of lime, afterwards rinsed, dried, and steeped in a decoction of this vegetable.

The bark of the cherry tree, and that of

the horse chesnut, possess the property of producing a greenish olive, with copperas; and chamomile flowers are said to dye wool a durable green, with sulphate of copper (blue vitriol.)

Preparation of Wool, &c. for Coloring.—To prepare wool for dyeing, it must be macerated in warm water, mixed with one fourth of stale urine, or in a tepid solution of soap, employing one pound, with a sufficient quantity of water, to every twenty pounds of wool.

Silk.—New silk is naturally covered with a kind of varnish, or gummy substance, and generally tinged of a yellow color. This must be removed by boiling it with soap and water for one hour and a half. It is sometimes necessary to whiten it still further by the fumes of sulphur, to fit it for lively colors. The sulphur which adheres to it after this operation must be removed by soaking and agitation in warm water.

The art of applying a variety of colors to the same cloth, cotton, linen or silk, topically, either by the printing block, types, or the pencil, may be interesting to some of our fair friends who add to their accomplishments in the mysteries of housewifery, skill in drawing, and a taste for those fine arts which contribute to the embellishment of their persons. We therefore subjoin a few directions for calico painting.

Calico Painting.—Let your cloth be prepared by being well bleached, washed, dried, smoothed, and spread on a table, or stretched on a frame, as may be most convenient. Then draw with the following preparation, the parts of the figure intended for yellow, green, or red. Alum, powdered, one ounce, sugar of lead half an ounce, warm water three ounces—mix them in a phial, and shake them often for three days; afterwards add one scruple of potash, and one scruple of powdered chalk, let it stand and settle. Then pour off the clear liquor, and thicken it with gum arabic sufficiently to prevent its spreading when applied to the cloth with the pencil; add a little powdered charcoal, if you please, to the mixture, to make the drawings more visible. Let it then be thoroughly dried by a fire, heating it as much as can be safely done without scorching it. Then draw, with the following, the parts of the figure intended to be black. Take iron filings, turnings, small nails, or iron otherwise divided into small pieces, and put them into vinegar, with maple bark, or galls, sumach berries, and a little logwood—let them digest till it forms a very black ink. Mix with this ink gum arabic, till it is sufficiently thickened, and apply it wherever black is wanted, be it on the alumed parts, or on those before untouched by that mordant. Dry it by the fire as before. Do you want blue or green? Take indigo one ounce, potash one ounce and a half, quick lime half an ounce, brown sugar three ounces, and boil them in three gills of water, till the mixture loses its blue color and becomes green or yellow, with a copper-colored or blue scum. Keep it in a well stopped bottle, and when wanted for use, pour out a little in a tea cup or wine glass, and drop slowly into it muriatic acid till it cease to effervesce. Then, if it be not sufficiently thickened by the sugar, add gum arabic, and apply it to the parts of the alumed figure which you intend for green, and to parts not alumed, intended to be made blue. Dry again, as before. If a dark olive be preferred to a black, or desired as an additional color, dissolve half an ounce of copperas in three ounces of water, and thicken it with gum arabic, and let it be applied to such parts as you wish should assume this color. Sulphate of copper, (blue vitriol,) used in the same manner, will give an olive inclining to yellow. In like manner other mordants may be applied, and a great variety of colors produced, by subsequently immersing it in a decoction of one or more dye-stuffs, as directed below. The cloth must now be soaked in warm water, in which a little ox gall has been infused, and rinsed out, without rubbing, till the gum and loose particles of matter applied by the pencil are washed out. Let it be now immersed in a decoction of quercitron bark, as directed for a yellow dye, and afterwards dipped in a mixture of warm water and powdered chalk, or weak lime water, and it will be found that the parts alumed have become a bright yellow, the alumed parts to which the indigo was applied have become green, the indigo on other parts remaining blue, the black unchanged, other colors produced on those parts upon which other mordants have been applied, and the remainder of the cloth slightly stained with the bark, which, however, will be readily removed by washing with cold or warm water, or by boiling it with water mixed with bran, and then slightly bleaching it in the sun and air on the grass. If you wish an addition of red, it may be now applied to the white or yellow parts in the following manner. Take alum two scruples, sugar of lead one scruple, nitro-muriate or murio-sulphate of tin one scruple, cochineal two scruples, water three ounces—boil them together, thicken with gum arabic, and apply it with a pencil as suits your fancy; on the yellow it will produce a scarlet, and on the white crimson. If instead of using the quercitron bark, you dye the cloth with madder, or Nicaragua wood, the alumed parts will become red, the indigoed purple, &c.

The preceding essay has been carefully, though hastily, compiled from Bancroft's Philosophy of permanent colors, and several other treatises on coloring, of good authority. Many of the methods directed we have proved correct, by experiments of our own, and we confidently recommend them to all interested. If the directions given be carefully followed, we doubt not any of the above colors will be obtained in a good degree of perfection. Good dye stuffs, of the kinds mentioned, will be indispensable to success. To distinguish the true quercitron from the bark of other oaks which nearly resemble it, you will do well to soak a small piece of it either in your mouth or warm water, and dip it in the murio-sulphate or other solution of tin. If it be the right kind, it will instantly show the brilliant yellow which it gives to cloths.

[From the Horticultural Register.]

ON HEDGES.—Hedges, or live fences, are becoming every day more necessary. In many parts of the country timber is too scarce for valuable fencing materials, and even in the few agricultural districts where stone abounds, the progress of cultivation, and the increasing wants of our growing towns, and villages, will sooner or later cause the farmer to resort to *living* materials for fencing his lands. For the *Garden*, hedges are undoubtedly preferable to all other means of inclosure in this country, where walls are so little used or needed. Their imperviousness, their durability, and their beauty, surpass either the most nicely constructed paling, or the firmest and smoothest wall. And what harmonizes so well with the pleasing green of the field, or the garden, as the verdant foliage of the lie fence?

What, then, is the best material for hedges? We, who are accustomed to draw a large share of our horticultural information from a nation older in this as in other arts and sciences, are taught to believe that the proper answer to this question is, the *English White Thorn.* But experience is teaching us that this is an error. How many millions of the English thorn have been planted in this country, and how few of them ever make a healthy and permanent hedge! The secret lies in the climate. The summers of England are *moist* and cool, when compared with ours. The powerful sun and dry climate, which bring to plentiful maturity the Indian corn, the peach and the melon, are not the sun and the climate which are congenial to the European Hawthorn. They are too fine and dry. In the moist and showery months of April, May and June, the Hawthorn looks exceedingly promising; its shoots appear green and healthy; but soon the hot July sun bursts forth, and it is checked almost as by a nipping frost. Then the insects attack it, and by the last of August the hedge is stinted and already leafless! Hence its growth is exceedingly slow, and as it is a prey to insects, which cause its decay, and to defoliation by the intensity of the summer sun, it is neither durable or beautiful. It is true, that during the first two or three years of its growth, its healthy and vigorous appearance is very flattering; but this is only whilst the plants are young, and before their interlacing roots and branches have found it necessary to attract nourishment from a limited portion of the surrounding soil.

It goes far to corroborate the opinion, that the dryness of our soil and atmosphere are the *first* causes of failure with the English Hawthorn, to find that in situations *naturally moist* and damp through the summer, it appears to grow with equal luxuriance, and to attain the same degree of maturity, as in Europe; but, as only small portions of the farm, and no good garden, will be found in moist localities, it is therefore necessary to search for some other material more generally adapted to the wants of our wide-spread territory.

There are over twenty species of *Cratægus*, or Hawthorn, indigenous or growing wild in North America alone — more than the aggregate number in the known world besides! Shrubs and trees which, for sharpness and abundance of thorns, beauty of foliage, rapidity of growth, and compactness of form, (when properly trimmed,) yield to none others of the genus. Is it not remarkable, that with this abundance and choice of materials for hedges, scattered by bountiful nature through every wood, and by every high-way side, that we should have to stretch forth our hands, and borrow from another clime a starved and lingering exotic? But so it is; and Horticulturists, as well as other men, must gather knowledge from experience. After repeated trials and failures with the imported plant, we are now content to turn our attention to the natives. Here we find species which are perfectly hardy, and to which our sun and climate are as necessary as they are injurious to the foreign. Four species have been already tested, and found to be admirably adapted for hedges, viz.: the Cockspur or Newcastle thorn (*Cratægus crus galli,*) the Washington thorn (*C. populifolia,*) and two others, only known by the common name of thorn bush (*C. coccinea* and *C. punctata.*) Of the Washington and Newcastle thorns, very fine hedges are now thriving in many sections of the country. They are found to grow with more luxu-

riance, to retain their fine vivid foliage through the hottest of the summer, and, in common with many other American trees, to assume an autumnal tint of the most beautiful crimson and orange, which remains until severe frosts. These two species seem to adapt themselves to almost any soil; but if not, their places may be supplied by such species as are found naturally to thrive best in the neighborhood—for almost every section of the country abounds with some species of Hawthorn. Perhaps in the Southern States, they will ascertain that some of the peculiarly southern species succeed best.

For situations where strong hardy hedges are wanted, in a short period of time, the three-thorned Acacia (*Gleditschia triacanthos*) will be found an excellent plant. Hence it is well adapted to *farms;* but from its rampant growth, it is difficult to keep it sufficiently close in its side spray properly to shelter the garden from all its enemies. Among the Hedge plants which demand the attention of the Horticulturist, are the Buckthorn (*Rhamnus catharticus,*) which makes an excellent fence; the Privet, long in use, and a beautiful and verdant *inner* shelter to the garden, but not a sufficient protection against cattle; and the *Mespilus pyracantha,* or Evergreen thorn, ornamented in its white blossoms and coral berries. European publications speak in high terms of the great beauty and excellence of the Japan Quince (*Cydonia japonica*)—already known here as a charming flower shrub,—used there as a garden hedge plant. We have great hopes of success, also, with the Osage Orange (*Maclura aurantiaca,*) a native of the West; and its glossy green foliage, stone thorns, and rapid growth, will place it in the first rank of hedge plants.

A. J. Downing.

Newburgh, N. J., March.

[From the Maine Farmer.]

Madder.—Since the commencement of this volume, we have occasionally presented you with communications on the subject of raising Madder. Madder is a root which is much used by the dyer and calico printer, and has hitherto been and is even now brought from Europe in vast quantities. Indeed, nearly all that is used in America is brought from across the Atlantic, for very few have ever cultivated it in the United States, or till lately have even thought of the thing. Mr. Russel Bronson, of Bridgewater, Oneida county, N. Y., has successfully cultivated it for a few years past, and has done much in calling the attention of the public to its culture.

We published some time ago his remarks in answer to some queries of ours in regard to the prospect of its doing well in Maine. Since then we have learned that a root or two was formerly grown in the garden of E. Wood, Esq., in this town, where it lived for several years without any particular care being taken of it. It was kept as a sort of curiosity, and was finally probably ploughed up and thrown away. There is, therefore, no doubt but that it will do well here, as far as soil and climate is concerned.

Mr. Bronson, who seems to have had as much experience in the culture of this root, and who has given what late information upon the subject we have had, is very sanguine that it will ultimately be one of the most valuable crops that the farmer can raise. He is anxious to get up a company for carrying on the cultivation on a large scale, and we verily believe the projected speculation has much more of reason in it than most of the schemes which are so eagerly embraced at the present day. The following extracts from a private letter will give an expose of his plan. Mr. Bronson, we hope, will excuse us for publishing his remarks. As for the ridicule which he mentions, that is a thing of course. There is always a set of wise-acres in every neighborhood, who are always ready to hoot and sneer at whatever they either envy or do not understand.

"I will not trouble you at this time by explaining the difference that should be made between the price of madder roots sold in the fall of three years old, and those sold in the spring, as it is my intention to send a communication to the editors of all the agricultural papers who have my name on their books as a subscriber, detailing the most approved mode of culture, the kind of soil, the location, digging, washing (or rinsing, as the soil may be heavy or light,) drying, grinding, &c. I would wish to remark here that I have not as yet given to the public any account of the method of digging, washing, drying and grinding, as I was aware that there would be no necessity of giving this information to the public until I should be compelled to search for the best plan in digging, washing, drying and grinding the madder from 8 acres next fall. The results of my experiments will be given to the public through the columns of the "Cultivator," "Genesee Farmer," "N. E. Farmer," and "Maine Farmer," in November next. There is not, I believe, but one cultivator, at a distance from this, whose crop is at this time of a suitable, but especially profitable, age to take up. I saw yesterday 1000 acres of land, owned by several farmers, that would, without a shadow of doubt on my mind, produce once in 4 years for 20 years a clear profit, decently managed, of *two hundred thousand dollars*—this would include the whole expense of rent of land, seed, cultivating, digging, drying, &c., and the interest of land and building included. You perhaps will say this looks well on paper, as one correspondent says to me—alluding to my communications as well as others—"My neighbors are the poorest farmers in the Union," they say; "That Cultivator is a queer paper, I don't believe them large stories;" "They ridicule my project in attempting the culture of madder." In my former communications to the public, I have never stated the crop at 3 years to be over 2000 lbs. ground madder—we now raise in hills 2400 hills to an acre—4000 in 4 years. We have never yet dug at 4 years until last fall, which produced 4000 lbs. ground madder from an acre at an average—what it will do from an acre planted in drills 3 feet wide, 4 vacant, and when finished 5 or 6 wide, 1 to 1½ feet vacant, we do not know, but supposing it should produce but 5000 lbs. at 12½ cents, (top and bottom roots ground,)—average price of Dutch madder in New-York market for 13 years past 15 cents, which is lower than the ten preceding years—this would amount to, at 12½ cents, $625—taking out the outlay $140 to 160, it leaves great profits. I have offered some of my neighbors, some time since, that if they would let me select some of their best land, and they go through with the process according to my directions, I would warrant them $100 clear of all expense per acre, they giving me the balance. Some would object to planting, as it took 3 or 4 years before any returns could be expected. I would ask how old a horse must be before he is fit for business. Others again objected that by the time their second crop should be ready for digging, the market would be glutted. I here remarked, that several estimates had been made relative to the quantity required for the consumption of the United States, varying from forty-five to seventy-five thousand acres. There is at this time in the ground, to be planted this spring, and engaged for 1836, not much over 100 acres. I have had it in contemplation for some time past, in offering my services to some capitalists, say $30,000 in 8 or 10 semi-annual instalments—would take a sixteenth part of the stock and superintend the establishment for $1000 per annum, to be located on the prairies of Ohio, Michigan, or perhaps Illinois. I should be pleased to receive communications on the subject. I should think it very important to the prosperity of a company, that dealers in the article residing in Boston, New-York, Albany, Utica, Rochester, Buffalo, and Detroit, should be associated with the company as stockholders and agents. I am about presenting the subject to a few gentlemen in Utica—a greater sum could be employed if wished. Respectfully yours,

R. Bronson.

[From the New-England Farmer.]

Wash for Fruit Trees.—A friend and patron of our paper wishes us to inform him what is the most improved wash for fruit trees, and says, "If I remember right there has been an improvement on Forsyth's composition." The following was, some years since, recommended by Mr. Benjamin Wheeler, of Framingham, Mass.

"Dissolve two pounds of potash of the first quality in 7 quarts of water, for the bodies of the trees. If the limbs are covered with moss or lice, I take a painter's, brush and apply the solution to the moss &c. with care not to touch the leaves or buds. It may be done at any time of the year when we are most at leisure. Once in two to four years is generally sufficient. I have no general rule, however, but wash them as often as they appear to need it, which is always when the bark is not smooth.

"No person need be afraid," Mr. W. continues, "of this application's injuring fruit trees; but it may be applied with the utmost confidence. I have used it for nearly twenty years with great effect. The reason it has not been more generally used is that it has been fashionable to dash

the trees with lime, clay, manure, and other compositions, which take two or three years to wash off before the tree will look natural. When this solution of potash is applied it has the desired effect immediately. It kills the moss and lice at once, and the first rain that comes washes the bark perfectly smooth, and gives it a fair, natural, and healthy color."

We have received requests for information relative to the subject of the following article, which we republish from the Boston Horticultural Register, vol. i. p. 34.

On a new method of writing on zinc, for labelling plants. — The following, from Paxton's Horticultural Register, will prove useful to Gardeners: Mr. Henry Braconnot, the celebrated French Chemist of Nancy, to whom we are indebted for the curious transformation of rags and other similar vegetable substances into starch, gum, and sugar, by the agency of the Oil of Vitriol, and whose name is well known in the chemical world for various researches connected with the analysis of vegetable substances, has given in the last number of the Annales de Chimie et de Physique, a preparation for writing on plates of zinc to label plants. The writer, having a dislike to painting in oil, which is often inconvenient and never endures a long time, resolved to turn his attention to some other way, which would prove both ready and durable. The system of writing on zinc with a black crayon, which was accidentally discovered by M. Symon, an amateur at Brussels, and noticed in the Revue Horticole for October, 1832, and the Bon Jardinier for 1833, possessing many imperfections, Mr. Braconnot, to try some experiment, being anxious to obtain a liquid, or a species of ink, which would be perfectly durable when exposed to the changeableness of the weather, and also one with which he could write with ease. This end, after several proofs, he is induced to believe he has in a great measure attained. If it answers, he will have done both the botanists and amateurs a real service. The preparation is as follows:

Take verdigris in powder one part, sal ammoniac in powder one part, lampblack (mori de fumea) half a part, water ten parts; mix these in a glass or pot mortar, at first only adding as much water as will mix it well, then add the remainder of the water; when placed in a vessel let it be well shaken up from time to time, and in a few days it will be ready for use. This is not only excellent for labelling plants, but also for marking objects it is wished to preserve in low, wet situations, and for marking keys, becoming quickly dry and being very durable.

[From the Maine Farmer.]

CAN ONE HUNDRED AND FIFTY BUSHELS OF INDIAN CORN BE RAISED ON AN ACRE OF LAND?—Mr. Holmes: In a late communication in the Maine Farmer I stated my opinion that 150 bushels of Indian corn might be raised on an acre of land. This I am aware may be thought an unguarded assertion by some, perhaps most of the readers of the Farmer. This, however, was not carelessly or thoughtlessly made. It never has been my object to countenance wild and visionary schemes of fancied improvements; but to establish simple truth. Yet as this project is considerably greater than has been obtained by distinguished agriculturists, perhaps an exposition of my view may be proper.

One hundred and fifty bushels is 38,400 gills: of course, if we can raise this number of ears on an acre, that will make one gill each, it will be done. We all know that it does not require a very large ear to yield one gill of shelled corn. Mr. Bowles states that in rearing his crop the last year of 116 bushels to the acre, he planted 8000 hills with 4 plants to each hill; this, allowing one ear to each plant, would be 32,000 ears to the acre, and to have produced the quantity here mentioned would have been only one gill and one fifth to each plant, or four gills and four-fifths to each hill. That this cannot be obtained by extra manuring seems to be evident for this reason, that excessively high manuring produces such a luxuriant growth of stalks and leaves, that the sun and air are too much excluded to mature the ear. Here then is the principal difficulty, how then can this be obviated? I have frequently observed a perceptible difference in the proportion of the ear to the stalk in different kinds of corn under the same treatment, as regards manuring and cultivation. Cannot an improvement in the habits of the corn plants be made in this respect? Satisfactory experiments have determined that the same variety of corn, as well as other plants, may be brought to ripen earlier or later, by selecting for a number of years in succession seed that ripens earlier or later, as the case may be. But I have never been made acquainted with the fact that experiments have been tried in like manner for the purpose of obtaining a variety that should excel the superiority of the ears in proportion to the size of the stalks. Experiments on many kinds of vegetables have been tried, with remarkable success, to render the fruit more perfect in proportion to the vines or stalks. For instance, cabbages and melons and many others. A writer in the 2d vol. of the Maine Farmer page 115, says, "In reference to seeds, it has long been known to farmers and gardeners, that those that are new and fresh produce plants with more luxuriant foliage, and less inclined to run into flowers and fruit, than such as have been kept some time." "These circumstances," he says, "are carefully considered in the culture of cucumbers and melons, the seeds of which are seldom used until several years old. A similar attention to this law, in reference to the seeds of other vegetables, is productive of equal benefit. Peas, for example, are well known as apt to run to straw, where the ground is rich and moist. The employment of old seed is the only suitable remedy." A friend of mine once stated to me that his father, who was an experienced farmer, said that one bushel of old rye was worth two of new to sow. This was winter rye. I know not the reason of his preference, I mention it to excite the curiosity of others to try experiments. H. C. says, (see page 131, of New-York Farmer) success in raising double ears or obtaining a seed that has this propensity, must depend, there is reason to believe, much more upon the selection of the seed for a succession of years from stalks bearing twin ears than upon the circumstance of its being the eight or twelve rowed kind. It may be remembered that H. C. was discussing the merits of these different varieties of corn. It recognizes however the existence of the principle we are now advancing, viz., the controlling effect of selecting seed from plants whose peculiarities we wish to continue.

If a propensity to produce twin ears may be obtained in this way, I know not why any other might not to some extent. I do not expect that all plants are alike susceptible of so great an alteration in their habits as some we have mentioned, but as the tending to an excessive luxuriancy of growth in the stalks of many kinds of plants seems at present to present an almost insurmountable obstacle to future improvement as to increasing their products to the acre, the subject is well worth a patient and persevering investigation.

There is another particular to which I would invite public attention, which is this. H. C. says, (also at p. 131, New-York Farmer, before referred to,) the richer the soil is made by manure, the later in all cases is the ripening of the corn, as the forage becomes more luxuriant and succulent. That this is a fact I admit as far as late ripening is concerned, but I do not admit the cause assigned. If I am correct in my observation, the most luxuriant corn shows its tassels and silk first and also fills the ear the soonest, though it does not ripen so soon. What is the cause of this? As far as my observation extends, the same remark will apply to grain. As I have given my views at some length on the effect of fermentation on the vegetation of grain, I will not enter into details on that point, but observe, that though Indian corn will bear the effect of excessive fermentation much better than grain, yet I am some suspicious that a re-rooting process may take place in corn, somewhat similar to grain, and this will certainly, if it does take place, protract the ripening of the stalk at the bottom, and of course the ear. Public attention does not appear to have ever been directed to this point. Another thing bears strongly on my reflection, though I am hardly willing to vouch for it, that I have at some time or other seen appearances on the roots of corn somewhat similar to those I have seen on grain. It is from a consideration of these facts that I have been led to advance the idea, that when we are properly skilled in the nature and use of manures, as well as have a correct understanding of what may be effected in the habits of plants, by attention to selecting seed in the best manner, as well as the best method of cultivation, that our crops of almost all kinds may be somewhat advanced.

Once more, and I have done with this subject for the present. I have never been in the practice of using Lime and Gypsum and other manures of a similar nature myself. I shall make a beginning this year. That these manures have "wonder working powers" I have no doubt, and when used with skill will be of essential benefit in producing the effect desired. But we must not expect complete success all at once; nor will it do to establish theories on solitary facts, we must have decisive evidence of a plenary kind. J. H. J.

Peru, April, 1835.

COTTON SEED OIL is coming into notice, and with the oil manufactured from flax seed. It is said to be in no respect inferior for all the purposes for which the latter article is used. It is for sale, at $1 20 per gallon, by the quantity.—[Mobile Pr. Cur.]

[From the Baltimore American.]

CULTURE OF TEA.—We find in the last number of the Westminster Review the fullest and most interesting account we have ever met with of the nature and culture of tea, a commodity which forms the chief bond of connexion between the empire of China with its population of three hundred and fifty millions, and the rest of the world.

The tea plant is a bushy evergreen shrub, which if permitted to attain its natural size will grow to the height of twelve feet. In botany it constitutes by itself a distinct genus, of which there is but a single species, the plants yielding the different

kinds of black and green teas being in reality no more than permanent varieties, the result of long culture. The plant has been cultivated in China from time immemorial. The latitudes in which it thrives best are from 23 to 30 north. Like the vine it is cultivated on the sides of hills in preference to plains. It is raised from the seed, and yields its first crop in from two to three years. When the best teas are raised, the plant is carfully pruned and prevented from attaining a height exceeding two or three feet. The production of good tea depends upon soil, locality and season, fully as much as that of good wine; like it, too, the produce varies according to the care with which the crop is collected and prepared for use. From the same plant are commonly taken in each season four crops, which is another cause of variety in tea as it appears in the market. The younger the leaves the higher is the flavor. The earliest crop is taken in the beginning of Spring, and the last in August.

The growth of teas of sufficiently high flavor to keep for a considerable time, and fit in consequence for exportation, was for a long time confined to two Provinces—Fokien, which yielded black tea, and Kiangnan, which yielded green tea. Of late years, owing to the great demand for teas in Europe and America, the culture has been extended to three additional provinces. The two original provinces, however, produce the best: the worst comes from the district of Woping in Canton.

In China, contrary to the usage of the other great despotisms of Asia, the soil is private property, and is very minutely subdivided. The leaves of the tea plant are picked by the cultivator's family, and conveyed at once in a fresh state to the market, where they are purchased by a particular class of dealers, who dry them under a shed, and in this imperfect state of preparation dispose of them to a second and higher class of traders, who sort the teas according to their qualities, and after completing the process of manufacture, pack them in chests. The tea arrives in Canton about the middle of October, and the busiest period of the trade exists from that time to the end of December. The traders in green tea amount in number to about four hundred: the dealers in black are less numerous but more wealthy. They accompany their chests, carried mostly by porters from distances of several hundred miles to Canton. In Canton the sorts quoted for export do not exceed fifteen in number, about eight of which are black and six green, the prices varying from twelve to sixty cents a pound.

In regard to the consumption of tea in different countries, the writer remarks that all the nations of Asia east of Siam and Camboja are what may be termed habitual and immemorial consumers of tea. With the Chinese themselves the tea-pot is in constant requisition, from morning till night, with persons of both sexes, of all ages, and all conditions. They use it always without milk, and frequently without sugar. Supposing—what is a very reasonable supposition—that each inhabitant on an average drinks twice as much as each inhabitant of Great Britain, the annual consumption in China would be half a million of tons.

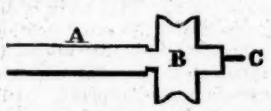
The use of tea in Europe commenced about one hundred and eighty-five years ago, and in this time the consumption has raised from a nameless fraction to nearly thirty thousand tons. A greater quantity is consumed in Great Britain than in all the rest of Europe and America.—As to the question whether China will be able to supply any great quantity in proportion to the increased demand, the writer in the Westminster thinks there is no doubt but it will. The culture which was extended from two to five provinces, to meet European demand, can be extended to many others. The land in which tea is cultivated consists of hills and mountains of no remarkable fertility, and not suited for the production of corn. Of these, notwithstanding the highly cultivated state of the plains and valleys of China, there is much unoccupied.

The effects of tea upon the human frame are those of a very gentle stimulant, producing an exhilaration of spirits. It is to this alone that it owes its general adoption. The diversity in the flavor of the different varieties, is probably fully as great as in the different varieties of wine. The Chinese themselves, and the oriental nations generally, hardly consume any thing but black tea. The English consume one part of green to four parts of black. The Americans, on the contrary, consume two parts of green to one of black.

[From the London Mechanics' Magazine.]

Easy Method of Drilling Holes in Glass for Philosophical Instruments.

Sir,—Having discovered what I consider to be a new and also very superior method of cutting holes in plate glass for electrical and other machines, and also of cutting glasses for optical instruments, I am induced to send you a description of the same, in order that it may be beneficial to others. I will first describe the instrument necessary to be made for the purpose, and then state how it is to be used. Make of thick sheet tin a tube 3 or 4 inches long, the diameter of which, measuring from the *outside* edge, must be somewhat smaller than that of the hole required. Let this tube be converted into a drill, thus:



A is the tube; B the head of the drill, turned out of the wood, part whereof goes about an inch into the tube; C is a piece of iron wire for the pivot. The open end of the drill should have a few notches made in it with a file, so as to admit the emery, necessary to work with facility.

Determine the size of the hole you want, say half an inch in diameter; then cut such a hole in a piece of flat wood, being not less than 2 inches square, and half an inch thick. Next, mark on the plate glass the situation of the hole wanted; take some melted beeswax, with, or without rosin, and fix the piece of wood on the glass, having the hole exactly over the place previously marked; place the glass on something flat, whereon some baize or carpet has been first laid, to prevent the glass from sliding during the process; mix plenty of grain emery with water, and put it into the open part of the drill; now place the drill in the hole of the wood, and with a breast-plate and drill bow, about 2 feet long, commence drilling. You must work at first very slowly to avoid chipping the edge of the glass, and afterwards proceed at a quicker rate, always taking care not to press on the drill more than sufficient to keep it steadily working, for otherwise there will be great danger of breaking the glass. When the drill is almost through the glass (which may be ascertained by looking at the other side of it), you must remove the carpet or baize, above alluded to, to obviate the danger of chipping the edge of the hole, and then proceed very slowly until the operation is quite finished. You will thus obtain a clean edged circular hole, with a corresponding piece of glass, and this without incurring the least risk of breaking. In this way a piece of plate glass, a quarter of an inch thick, may be cut through in less than ten minutes.

I have adopted this mode of cutting holes in plate glass for electrical machines, and it is obvious that it may be also applied to the cutting of glasses for optical instruments. Here, however, the diameter of the *inside* of the drill must, to allow for friction, be a trifle larger than the diameter of the glasses required; for if no allowance be made, it will be found that the piece of glass will be somewhat smaller than was required.

I am, &c. F. H.

Bath, Dec. 29, 1834.

[From the Mechanics' Magazine.]

To find the Length of the Sweep and Crutch for a Well—the Depth of the Well given.

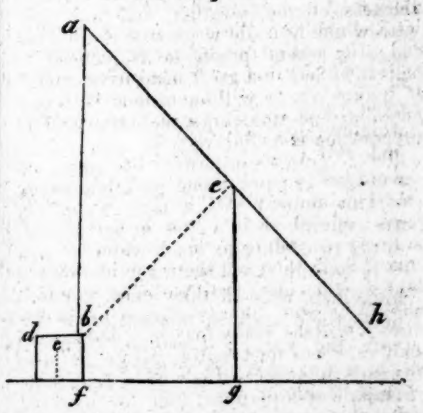
Rule—The square root of half the square of the depth of the well, with the height of the curb added, is equal to the distance from back side of curb to centre of pin on which the sweep hangs; and the square root of half the space of that distance, with half the width of the curb added, is equal to the distance the crutch should be from the well, and the height of curb added gives the height of the crutch from the ground, consequently the length of the sweep will be twice the distance from the curb to centre of pin, less one foot. But to make it work easy, there should be an allowance of about six inches in height, and in the distance from the well, that is, the pin 6 inches lower, and 6 inches further from the well, which will give about one foot more on upper end of sweep, which allowance is in consequence of the upper end of the sweep being smaller.

Thus—$\sqrt{a\ b^2} \div 2 = b\ e$

$\sqrt{b\ e^2} \div 2 + c\ b = g\ f$

$\sqrt{b\ e^2} \div 2 + f\ b = g\ e$

Then, $2b\ e = a\ h$.



Examples—I have a well 21 feet deep, and the curb around it 3 feet high, and 3 feet square—required to know the length of the sweep, height of crutch above the ground, and how far I must set the crutch from centre of the well.

$21 + 3 = \sqrt{24^2} \div 2 = 17$ feet, distance $b\ e$ from curb to pin.

$\sqrt{17^2} \div 2 + 1.5 = 13.528$ feet, distance from well.

$\sqrt{17^2} \div 2 + 3 = 15.028$ feet, height of the crutch.

And $17 \times 2 - 1 = 33$ feet, length of sweep.

Then, as was stated above, we will make an allowance of six inches, or 0.5 of a foot,

$13.528 + .5 = 14.028$ feet.

$15.028 - .5 = 14.528$ feet.

S. A.

Apparatus for Making Ship's Biscuits. By THOMAS TASSELL GRANT, Esq., of Weovil, near Portsmouth.*

The advantages claimed for the new, over the old method of preparing ship's biscuit, are, superior economy and expedition, greater cleanliness in the process, and a better quality in the manufactured article.

The mode of making ship's biscuit, as practised in the king's bakehouse at Portsmouth, was as follows:

Five men were appointed to the service of each of the nine ovens, being forty-five in the whole.

The first of these was the idleman, whose business was to mix the meal and water in due proportions, and to incorporate the materials as accurately as possible by kneading the dough for half an hour, with his naked arms plunged into it up to the elbows, and finishing the operation by jumping into the trough and treading the dough with his feet. Hence it passed to the brakeman, who completed the kneading by means of a lever, on which he pressed with his whole weight, this part of the process being called riding down the dough.

It then passed into the hands of the furner, who first divided the dough into lumps somewhat bigger than an egg, and passed them on to his mate, who pressed and moulded each by hand into the form of a biscuit, and finished by pricking them with an iron instrument, to prevent blisters from rising in the dough during baking.

The biscuits being thus formed, were supplied in succession to the pitcher, who threw each on the peel of the furner as soon as he had deposited the previous one in its proper place in the oven. Each oven was capable of holding 450 biscuits, weighing together one hundred weight; and two charges, that is, 900 biscuits, were baked in an hour.

The above-described process, besides the general slovenliness of it, was liable to the two following disadvantages:

It was not possible for the idleman and brakeman, with all their care, to effect a perfect and uniform mixture of the flour with the water; the consequence of which was, that the wetter portions detained some of the water till it was boiling hot, and in that state re-acted on the starch of the flour, so as to give the biscuit, when dry, a glossy fracture and almost stony hardness.

Neither could the furner divide the mass of dough into lumps of perfectly equal size, in consequence of which, the biscuits being of various thickness, the thinner ones were scorched in the baking, and the thicker ones were under-baked, so that they soon became mouldy in the close warm air of a ship's bread-room.

In Mr. Grant's apparatus, the greater part of the labor is performed by steam power; the nine ovens are heated by one continuous fire-place, the flame of which is admitted by means of a register into each oven as soon as the previous charge has been withdrawn, and in five minutes brings it to a sufficient heat. It takes fourteen or fifteen minutes to bake each charge, so that three charges can be worked off in one hour, being an advantage in point of expedition of one-half more than by the old method.

This apparatus was first erected at Weovil, near Portsmouth, in the year 1832, under the immediate superintendence of Sir John Rennie, and has continued at work successfully up to the present time. It has since been adopted, with certain modifications, at the bakehouse of Messrs. Fraser and Hullah, of Wapping, who have kindly permitted the Society to inspect it, and to take the requisite observations for preparing the annexed sketches and description, by which it is hoped that it will be rendered generally intelligible.

The first machine is the mixer, of which fig. 1 is an end elevation, fig. 2 a transverse section, and fig. 3 a longitudinal section. It consists of a cast-iron case, *a*, *a*, nearly four feet long and three feet in diameter, enlarged, however, at the upper part, a few inches beyond the circular form, as shown by the upper dotted line in fig. 2. The radical lines in fig. 1 are merely ribs to strengthen the end of the case. A flap or door, *b*, *b*, the whole length of the case, opens upwards, to enable the workmen at any time to inspect the interior; and another larger flap or door, *c*, *c*, opens downwards, for the purpose of removing the contents of the case. This latter door is opened and shut by means of a quadrant-rack, *d*,

Fig. 1.

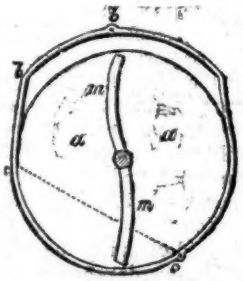


Fig. 2.

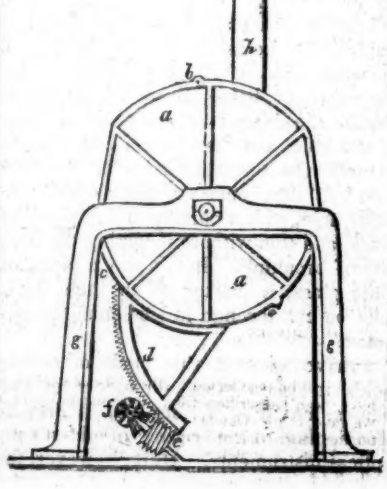
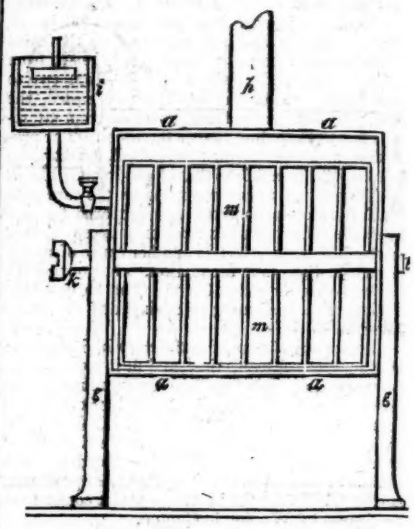


Fig. 3.



worked by an endless screw, *e*, which is moved by a pair of bevel pinions, *f*, and these are acted upon by a small winch and axle attached to the supports, *g*, *g*. The operation of this machine is as follows: The requisite quantity of flour is sent down from the loft above by the shoot, *h*, and the proper quantity of water is supplied from the small cistern, *i*, which has a float and gauge, with a line and pulley, to indicate the quantity admitted from a larger cistern above, and a pipe and cock to convey the water into the case. The flour and water being admitted, the central axle or shaft, *k*, *l*, is put into gear with the steam engine by means of the coupling-box, *k*; the axis is thus made to revolve very rapidly, carrying around with it the frame of eighteen knives or mixers, *m*, *m*. These knives, which are curved, as shown in fig. 2, are two inches wide, and three-eighths of an inch thick at the back; they are connected at their extremities by similar longitudinal knives, which, in revolving, almost touch the lower part of the case. By these means, it is evident that the flour and water must in a short time become thoroughly mixed. The paste is then removed by hand through the door, *c*, *c*, and placed upon a table, which is as close as convenient to the mixer, and which is now to be described.

This table is shown in an elevation fig. 4, plan fig. 5, and transverse section fig. 6. It has a cast-iron frame and legs, *a*, *a*, *a*, a cast-iron bed, *b*, *b*, (six feet and a half long and three feet wide,) in which are the six holes, *c*, *c*, &c., to receive friction-rollers, on which run the boards to receive the dough. Fig. 7 is an enlarged section of the side, *a*, of the table; *b*, is the bed; *c*, one of the friction-rollers; and *d*, the board. The sides, *a*, *a*, of the table support a very heavy cast-iron roller, *e*, eighteen inches in diameter, which, when resting on the table, is about two inches clear of the board, *d*. This roller is made to run alternately, and with great rapidity, from one end of the table to the other, by means of a pair

* The large gold medal was voted by the Society of Arts for this apparatus.

Fig. 4.

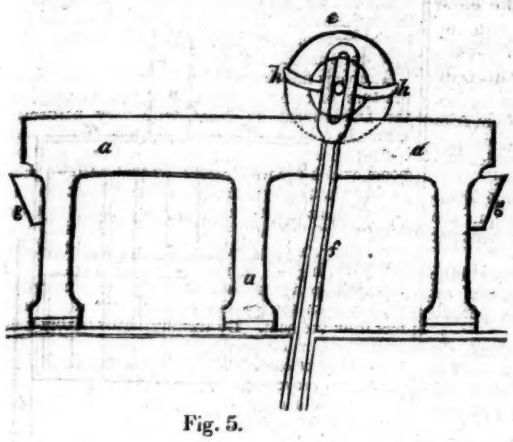


Fig. 6.

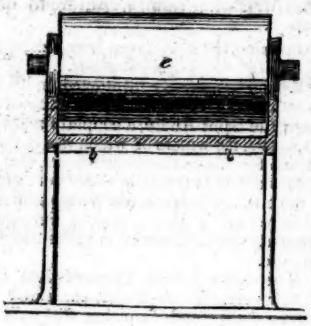


Fig. 8

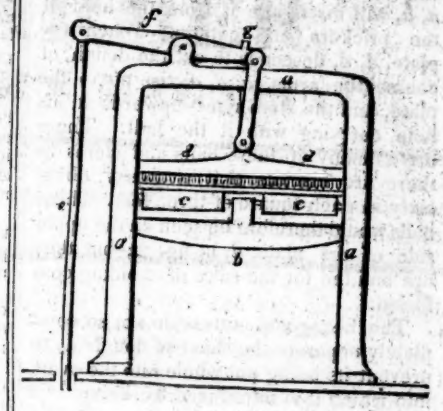


Fig. 5.

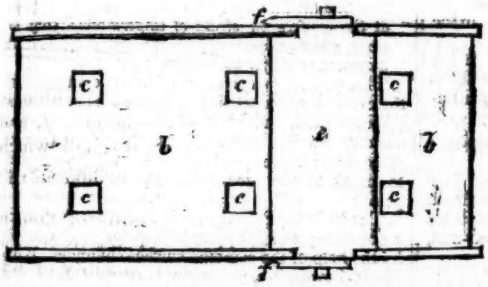


Fig. 7.

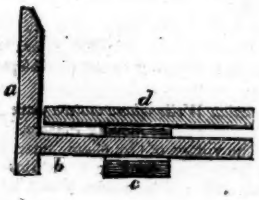
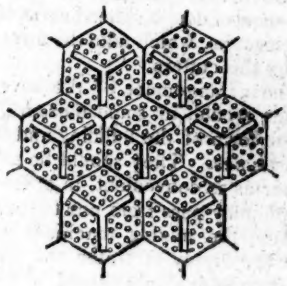


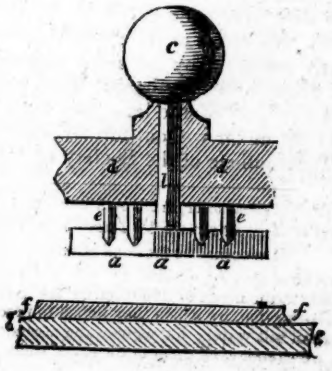
Fig. 9.



of beams ten or eleven feet long, attached to centres below the floor under the middle of the table, and made to alternate by a crank from the steam engine; the upper end of one of these beams is seen at *f*, fig. 4, showing the groove in its extremity, to allow the axis of the roller to play in it as the beam alternates. It will now be evident, that when a mass of dough or paste is taken from the mixer and placed upon the table, it must quickly be compressed by the roller into a cake equal in thickness to the distance of the roller from the board, which, in this case, is two inches. During this process a considerable quantity of dry flour is sprinkled on the dough and on the board, a large portion of which would be swept off by the roller and lost, but for the troughs, *g*, *g*, at the ends of the board, which catch and retain it. Notwithstanding this sprinkling with dry flour, a small quantity of dough would occasionally adhere to the roller, were it not kept constantly and perfectly clean by means of two thin knives, extending on opposite sides along its whole length, and attached to two pairs of curved arms, one pair of which, *h*, *h*, is seen fixed to the beam *f*. When this operation is finished, the board with the dough is withdrawn, and another board introduced, on which the process is repeated. The first board and dough being withdrawn, are conveyed on a series of friction-rollers, to a second table, precisely similar to that just described, except that the roller approaches to the board within such a distance as is required for the thickness of the biscuit. The dough, which was reduced to a cake two inches thick at the first table, is cut into pieces, and laid in portions on the second table, where it is quickly brought down to the proper thickness for biscuits. The board containing this comparatively thin sheet of dough is pushed forward, still running on friction-rollers, towards a machine next to be described, while the workmen at the second table repeat their operations on the fresh portions of the dough which they have received from the first.

The machine, towards which the board and sheet of dough now rolls, is shown in fig. 8: it consists of a strong cast-iron frame, *a*, *a*, *a*, with cross-beams, *b*, supporting three or more pairs of rollers, *c*, *c*, on to which the board is pushed. Immediately above is a thick plate of cast-iron, *d*, *d*, three feet square, which is made to ascend and descend alternately by an eccentric, which acts on the rod, *e*, the lever, *f*, and the guide-rod, *g*. The iron plate, *d*, is shown in the figure at its lowest position; it is, of course, at its highest when the dough and board are brought under it. When this is done, it descends and cuts the dough into hexagonal pieces or biscuits, by means of thin knives, one inch wide, affixed to its under surface, and arranged so as to form hexagonal spaces. A small part of the under side of the plate, *d*, *d*, is shown on a larger scale in fig. 9, where, in addition to a portion of the hexagonal knives or cutters, will be seen a number of small dots or circles, which indicate the pins or prickers to give the requisite punctures to the biscuits before they are baked. These pins are as long as the depth of the hexagonal cutters; that is to say, one inch;

Fig. 10.



they are about one-third of an inch in diameter, and pointed at their extremities.* The effect of all these cutters and pins would, however, be to cause the plate, *d*, to cling to, and lift with it, the sheet of dough. In order to prevent this, a very ingenious contrivance is introduced; a part of which will have been observed in fig. 9. In each hexagon will be seen three arms, branching from the centre. These are formed of iron, and each set is connected with a small vertical iron stem, which passes through the plate, *d*, moving easily, and is surmounted by an iron ball, two inches in diameter, acting as a weight to press the stem and the arms downwards. One of these balls, with its stem and arms, and a portion of the plate, *d*, *d*, is shown in fig. 10, where *a*, *a*, *a*, are the three arms; *b*, the stem; *c*, the ball; *f*, *f*, a portion of the dough; and *g*, *g*, a part of the board beneath. It will easily be understood, that when the plate, *d*, *d*, rises, the stem, *b*, will drop through its hole, pressed by the ball, *c*,

* It will be recollected by those of our readers, who have been subscribers from the commencement, that we gave, in the October number of vol. ii, a description and engraving of a cracker machine—of the relative merits of which we are not able to speak.—[Ed. M. M.]

and acting on the dough by the arms, *a*, *a*, *a*, will disengage it from the hold of the prickers and cutters. When the plate, *d*, *d*, descends to cut the dough, of course the arms, *a*, *a*, *a*, rise up to the plate, and the stem rises upwards in its hole, carrying with it the ball. There are as many of these balls and stems as there are biscuits, that is to say, about sixty in each square of three feet. These balls would therefore be seen on the upper side of the plate, *d*, in fig. 8; but they are omitted for the sake of avoiding confusion.

The hexagonal cutters do not so completely separate the sheet of dough as to prevent its being put whole into the oven, into which it is introduced by being laid on a plate of iron, which fits on to the handle of the peel by a bayonet-joint. The sheet of dough, when baked, is broken into biscuits, which take the form marked out by the cutters.

The arrangement of the several machines would, in some measure, depend on the form of the building and other circumstances. They should be as near together as is convenient, in order that the boards may pass from one to the other on rollers; the mixing machine should be near the supply of water and flour; and the cutting-machine should, of course, be near the oven. A series of rollers should be fixed against the wall, for the purpose of returning the boards to the first table after they have been emptied. At Portsmouth, this series of rollers was kept constantly revolving by the steam-engine, so that when the empty boards were placed upon any part of the line, they travelled up to the mixer without further attention. —[Transactions of the Society of Arts,]

[From an Essay of M. Arago on Artesian Wells.]

Depths of the most remarkable Fountains which have been opened by the hand of man.

We have already alluded to pits sunk by the Chinese to the depth of 1800 feet, in the province of Kia-ting-fou, by which they hoped to procure a supply of salt water; but as no water ascended the pits, we cannot rank them in the list of wells properly so called.

The seventh sheet of water, found near Saint Nicolas-d'Aliermont, was at the depth of 1030 feet.—The water from it rose to the surface. As it was not water, but coal, that was sought for, the works were abandoned; and the only result that remained, was the formation, without intending it, of a copious fountain, whose waters issued from a source more than 1000 feet deep.

The pit recently sunk at Geneva to the depth of 682 feet, has not reached any body of water which has a tendency to rise.

At Suresne, near Paris, the residence of M. Rothschild, the Messrs Flachat have worked a pit, previously begun by M. Mulot, to the depth of 663 feet. This pit has now penetrated the chalk to the extent of 537 feet. The work has been suspended, when there is only 60 feet more of the chalk formation remaining, upon penetrating which, there would be every prospect of finding water.—The desirableness of prosecuting the research is most apparent.

The fountain of Cheswick, in the Duke of Northumberland's park, projects its water about a yard above the surface of the soil, and comes from the depth of 582 feet.

The deepest fountain in the department of Pas de Calais is situated between Béthune and Aire. Its waters project seven feet above the ground, and come from a depth of 461 feet.

The artesian well which affords such an abundant supply in the cavalry barracks of Tours, is fed by a body of water which M. Degousée found at the depth 259 feet. The water of another well, which was finished in 1834, in the silk manufactory of M. Champoiseau, springs from a depth of 273 feet.

Concerning the Daily Issues from some of the Principal Fountains.

Belidor has already mentioned, in his Science de l'Ingénieur, a fountain which is situated in the monastry of Saint André, a couple of miles from Aire in Artois, the waters of which rise to the height of eleven feet above the ground-floors, and which furnishes nearly two tons of water per minute.

The well which Messrs. Fabre and Espériquette have sunk, at Bages, near to Perpignan, in the property of M. Duvand, supplies 333 gallons per minute.

The well which M. Degousée had sunk in the cavalry barracks at Tours, measured at six feet above the ground, furnishes 235 gallons per minute.

Of the many wells which exist in England, the one whence, according to my knowledge, there is the most abundant supply of water, is that in the copper manufactory of Merton, in Surrey; its issue amounts to 200 gallons a minute.

The artesian well of Rivesaltes, for which the inhabitants are so much indebted to Messrs. Fabre and Espériquette, engineers, furnishes 176 gallons in the same time.

The well lately sunk near to Lillers, in the department of the Pas-du-Calais, with a depth of 140 feet, affords a supply of 155 gallons per minute.

Of Artesian Wells whose waters have been employed as Moving Powers.

At the village of Gouéhem, near Béthune, four wells have been sunk in a meadow to the depth of 120 feet. The waters which issue from them are converted into the water-course of a flour-mill, and subserve other agricultural processes.

At Saint Pol, there is another mill, the only moving power of which is the water from five projecting fountains.

At Fontès, near Aire, the waters of ten such wells are made to turn the mill-stones of a large mill, as also to blow the bellows and beat the hammers of a nail manufactory.

At Tours, M. Degrousée has excavated a well, in the silk manufactory of M. Champoiseau, to the depth of 430 feet, which pours 287 gallons of water per minute into the troughs of a wheel of twenty-one feet diameter. This wheel works the looms of his manufactory.

At Tooting, near London, the fountain of an apothecary puts a wheel of four feet diameter in motion, and this sets a pump to work, which raises water to the top of a house three stories high.

Of the advantage to which Industry, in various circumstances, has turned the Waters of Fountains.

On the present occasion we need not dilate on the benefits these waters confer on public health, nor on their use in irrigation, &c. &c. We shall only point out their application to a few purposes which are less generally known.

These springs have been put in requisition even in countries where more common-courses are not unfrequent. Their constant and high temperature permits them to be applied to the movement of machinery during the most severe winters, whether it be directly, when they are abundant, or in other cases, only as a means of washing away the ice, which is apt to stop the movements of the water wheels.

In Wurtemburg, M. Bruckman, by transmitting through metallic pipes, conveniently placed, a current of water, at a temperature of 54 deg. Fahr., which is derived from several natural springs, keeps up a temperature at 47 deg., in various manufactories where the external cold lowers the thermometer to zero. This is a simple imitation of a plan which has been long practised in the village of Claudes-Aiques, the results, however, are worthy of consideration.

Greenhouses also are in existence, in which the temperature is maintained very equally, by the effects of the constant circulation of a large quantity of water, derived from these sources.

During heavy rains, the work of paper-mills is often interrupted, on account of the impurity of the water. These forced stoppages come to an end, when the constant limpid supply of a projecting fountain can be employed.

In some localities the invariable pure waters of a steady temperature, proceeding from these springs, have been the means of establishing very lucrative artificial cress-plots. The beautiful growth of cresses in those parts of the beds of rivulets where the natural springs existed, has suggested this application. It is positively stated that the artificial cress plots of Erfurt yield not less than 12,000*l.* per annum.

The very fine lint which is intended for the manufacture of cambric, lawn, lace, &c. is steeped in the Department du Nord, with very particular care. In a single *Commune*, between Douai and Valenciennes, there are ten or a dozen rattling-pools, which are fed entirely by water from a projecting fountain. It has been thought that the purity of these waters, and the invariability of their temperature, by accelerating the gum-resins, preserve the valuable qualities of the filaments of the lint in the highest degree of perfection.

In fish ponds, the fish are apt to die during the winter, from the severity of the cold, and in summer from the heat. By turning the invariably temperate waters of an abundant artesian well into them, the extreme variations which the seasons induce are prevented. This experiment it is said, has entirely succeeded in the ponds of St. Gratien, near to Montmorenci.

Sometimes Pits are sunk for the purpose of transmitting into the interior of the earth, water, retained at the surface by strata of impermeable clay or stone, and thereby rendering extensive districts mere morasses, unfit for cultivation.

The pits by which descend into the interior of the earth those quantities of water which, without this expedient, remain on the surface, may be called *negative artesian wells*. Necessity, the mother of so many important inventions, early suggested to mankind the idea of imitating nature in this point.

The plain of Paluns, near Marseilles, used to be a great morass. It appeared impossible to drain it by the help of the common surface channels. King René, however, caused a great number of pits or drain-wells to be sunk, which are known in the Provençal language by the name of *embugs* (funnels.)* These pits transmitted, and now transmit, in the permeable strata situated at a certain depth, those waters which made the whole country a barren waste. It is positively stated that it is the waters taken down by these embugs of Paluns, which, after a subterranean course, form the projecting fountains of the port of Mion, near to Cassis.

The river Orbe, in the Jura, which descends from the lake of the Rousses, conveys into lake Joux much more water than evaporation removes from it. This latter lake, whence there issues no river, preserves, notwithstanding, a stated elevation which is nearly uniform. "It is," says Saussure, "because nature has provided for these waters subterranean issues, by which they are engulfed and disappear. * * * * As it is of the greatest consequence for the inhabitants of this valley to preserve these natural drains, without which their arable lands and their habitations would be immediately overflowed, they preserve them with the greatest possible care; and when they perceive that they do not take off the water with sufficient velocity, *they themselves open new ones.* For this purpose, all that is necessary is to sink a pit fifteen or twenty feet, having a diameter of about 10 feet, in the thin and vertical strata, the summits of which appear on the surface. The name of *entonnoirs* (funnels) is given to these pits. * * * * It is," adds Saussure, "the waters absorbed by all these entonnoirs, that are observed to rise from the earth, and form a large spring, which is also called Orbe, at the distance of two miles below the southern extremity of the lake." In this passage of two miles, the absorbed waters descend 680 feet.

A manufacturer of potato starch at Villetaneuse, a small village about three miles from St. Denis, in the winter 1832–3, by means of a pit sunk to the depth of certain absorbing stratified beds, got rid of not less than 16,000 gallons of impure water per day, the stench from which had given rise to serious complaints, which probably would have compelled him to give up his establishment. After six months of daily absorption, nothing was found at the bottom of the pit except sand, and this has been uniformly the case from the first.

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* It is the property of absorbing, of drinking up the surface waters, possessed by certain natural and artificial openings, which has given the names of boit-tout, of betoirs or boitards, to these drain-wells in certain districts.